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ACTINOMYCOSIS: TREATMENT OF FIVE CASES

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ACTINOMYCOSIS in the human being is a chronic, suppurative disease resulting from infection with the fungus Actinomyces hominis. It is characterized by great tissue destruction, pus formation, leukocytic infiltration and the production of a dense fibrous tissue so profuse as to result in the appearance of a tumor-like mass.

History

The tumors of actinomycosis as they appear in cattle were described first by Leblanc in 1826. However, he failed to recognize this as a new disease and classified it as osteosarcoma. Bollinger[1] was the first to recognize it as a specific parasitic disease in 1877. Harz[2] studied the fungus and named it Actinomyces because of the raylike structures resulting from the process of its growth in the tissues. Israel,[3] Wright[4] and Emmons,[5] chiefly, are responsible for the state of our present day knowledge of the disease and its parasite.

1. Bollinger, cited by Jacobson, H. P., Actinomycosis: A Clinical, Pathological and Bacteriological Study. *M. J. & Rec.* **132**:342 (October 1) 1930.
2. Harz, cited by Jordan, Edwin O., and Burrows, William, *Textbook of Bacteriology*. Philadelphia: W. B. Saunders Company, 1943.
3. Israel, cited by Jacobson, H. P., A Clinical, Pathological, and Bacteriological Study. *M. J. & Rec.* **132**:342 (October 1) 1930.
4. Wright, J. H., Biology of the Microorganisms of Actinomycosis. *J. M. Res.* **13**:349 (May) 1905.
5. Emmons, C. W., Isolation of Actinomyces Bovis from Tonsillar Granules. *Public Health Rep.* **53**:1967 (November 4) 1938.

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Strains of Actinomyces were isolated from mouths of normal human beings by Naeslund.[6] One of these was an anaerobic form which appeared identical with the organisms isolated from actinomycotic lesions. Wright[4] performed successful inoculation of laboratory animals with organisms isolated from human as well as bovine lesions. However, he believed that the same organism is responsible for the disease in both man and animals. He also verified Naeslund's discovery of the parasites in the mouths of healthy individuals.

Breed and Conn[7] worked out a system of nomenclature and classification of the Actinomyces species in which they differentiated the anaerobic, parasitic pathogens from the nonpathogenic saprophytes. Lord[8] demonstrated the presence of Actinomyces in the carious lesions of teeth, in the pulp canals of nonvital teeth and in the gums and tonsillar crypts of individuals free from actinomycosis. He also was able to produce symptoms of the disease in laboratory animals inoculated with the organisms obtained from these sources.

Etiology

The etiology of human actinomycosis definitely is traced to organisms causing lesions in the human being as distinct from the bovine type. The early supposition that actinomycosis in the human being was associated with cattle or agriculture was based on the following observations:

1. There are approximately eighty forms of Actinomyces. Most of these resemble the pathogenic forms closely and find their natural habitat on the grasses and cultivated grains.

2. The bovine form of the disease presents a clinical picture similar to its prototype in the human being, and the causative agent of actinomycosis in cattle is almost indistinguishable from Actinomyces hominis in its morphology and cultural characteristics. However, there is a significant clinical difference in that the bovine form of the disease often produces lesions of the bony structures while the disease in human beings is a peripheral type which rarely, if ever, penetrates beyond the soft tissues.

3. Particles of hay and straw have been found by various investigators in actinomycotic lesions of the mouth and skin. Most authorities today accept the view that these foreign bodies, rather than serving as vehicles for the introduction of an exogenous infection, merely produce the trauma which, under favorable conditions, may result in an endogenous infection by organisms normally found in the oral cavity. The authors' findings are that human actinomycosis has no association with cattle or agriculture.

The theory that the disease may be contracted by chewing straws, grasses and so forth, or by contact with the infected domestic animals, is not well founded since this hypothesis does not fit the clinical picture.[9] The number of patients with a history of direct or indirect association with agriculture or agricultural products is entirely out of proportion to the agricultural population. Furthermore, it never has been demonstrated satisfactorily that the pathogenic forms of actinomycosis are to be found on the grasses in a state of nature.[9]

Actinomycosis frequently is complicated by what has been termed secondary

6. Naeslund, C., Studies of Actinomyces from the Oral Cavity. *Acta path. et microbiol. Scandinav.* **2**:110, 1925.
7. Breed, R. S., and Conn, H. J., Nomenclature of Actinomycetaceae. *J. Lact.* **4**:585 (November) 1919; **5**:489 (September) 1920.
8. Lord, F. T., Etiology of Actinomycosis. *J.A.M.A.* **55**:1261 (October 28) 1910.
9. Rosebury, T., Epps, L. J., and Clark, A. R., A Study of the Isolation, Cultivation and Pathogenicity of Actinomyces Israeli Recovered from the Human Mouth and from Actinomycosis in Man. *J. Infect. Dis.* **74**:131 (March-April) 1944.

infection. It is probable that such infection by pyogenic organisms may precede the actinomycotic infection and may result from the presence in the tissues of a foreign body or an infected or impacted tooth. Such a suppurative process is known to lower the oxygen tension in the tissues involved and consequently may produce conditions ideal for the propagation of the anaerobic Actinomyces.

Bacteriology

The available literature pertaining to the Actinomyces is in a state of confusion. There is little agreement in the opinions of investigators as to the characteristics of the organisms in this classification. Identification of these filamentous organisms, therefore, is rendered difficult and, at best, is uncertain.[10] This confusion is due to several factors. The large number of organisms (approximately eighty) classified in the genera Leptotrichia and Actinomyces, together with their close morphologic resemblance, is partly responsible. In addition, the organisms producing disease in animals and man, as well as many of the nonpathogenic forms, show widely divergent morphologic characteristics under different environmental conditions. The organism recovered from a freshly incised abscess or by aspiration from an unopened tumor differs in appearance from that found in an old draining sinus. It differs, again, from the organism produced by culture. Furthermore, the available culture mediums in which the organism will thrive appear to exert their own unique influence on the parasite's morphology. Dramatic changes in morphology, cultural characteristics and biochemical activity appear to result from variations such as the age of the culture, temperature of incubation and the specific medium employed, as well as other bacteriologic conditions. In older cultures (more than forty-eight hours) the characteristic filaments undergo pleomorphic segmentation into bacillary and coccoid forms often indistinguishable from the common bacteria.[11]

In tissue, the presence of organisms producing secondary infection contaminates and obscures the bacteriologic picture. Consequently the causative organism is isolated and identified most easily when found in the pus secured from a fresh incision under aseptic conditions or aspirated from an unopened abscess. It appears in the form of small, lobulated or spherical, sulfur yellow or grayish granules. These granules may be microscopic in size or as large as the head of a pin, depending on whether they consist of a single rosette of the ray fungus or are compacted of several. Under the microscope the typical rosette is seen to consist of a central core of true-branching filaments irregularly disposed but diverging from a common center. At the periphery, the filaments assume a radial arrangement and occasionally are thickened somewhat into club-shaped bodies. However, too much importance has been attached to the diagnostic value of the clubs. While they are readily seen in the organism causing the bovine disease, the filaments of Actinomyces hominis are found only in rare cases with slightly swollen ends.[11]

The ray fungus may be studied in fresh preparations made by crushing the sulfur granules between two sterile slides, in tissue sections secured by biopsy or in material secured from cultures. The central filaments take Gram's stain while the peripheral fringe and the clubbed bodies, when present, are gram-negative. However, they stain with methylene blue and with eosin. In hematoxylin-eosin staining, the matted central mycelium appears blue while the periphery takes the pink stain.

10. Bartels, H. A., A Filamentous Micro-organism Isolated from Stained Teeth. *J. D. Res.* **22**:97 (April) 1943.
11. Bryant, C. K., Laboratory Report of a Case of Actinomycosis. *D. Cosmos* **64**:196 (February) 1922.

Symptomatology

Pain is not a prominent feature in cervicofacial actinomycosis. The patient's general health is not affected to any great extent, particularly in the early stages of the disease. The temperature remains normal or low grade. The infected area is highly indurated and of boardlike consistency. Except in cases involving impacted teeth, roentgenographic evidence is negative since human actinomycosis seldom affects the bony structures. The skin overlying the area is of a dark red or purplish hue and its surface is uneven or lumpy. In the later stages, as the infection progresses toward the surface, nodular bodies typical of the condition develop. They gradually increase in size from that of a small pimple to the area of a dime. These nodules break down progressively and multiple draining sinuses appear.

Since the muscles of mastication are involved, trismus (false ankylosis) develops. Intra-oral extension of the process may produce dyspnea resulting from pressure on the larynx. The cervical lymph nodes rarely, if ever, are involved. This is a valuable diagnostic feature of the disease.

Diagnosis

According to Boyd[12] the lesions of actinomycosis occur in the following sites:

1. Head and neck ..... 60 per cent
2. Intestinal tract (ileocecal region and appendix) ..... 20 per cent
3. Lungs ..... 15 per cent
4. Skin ..... 5 per cent

Since the oral cavity and the mucous membranes of the digestive and respiratory tracts are believed to be the natural habitats of the organism, producing primary infection in these sites in 95 per cent of all cases, it becomes obvious that the disease is of paramount interest to the dental profession, not only from the preventive point of view of maintenance of good oral hygiene—especially before and after the performance of surgical or exodontic procedures—but in connection with prompt and accurate diagnosis of the disease. This is particularly true in view of the fact that the condition often remains undiagnosed for long periods of time, and ineffectual treatment including the extraction of many uninvolved teeth often is resorted to in an effort to give the patient relief. When the condition involves the teeth, as in cases of pericoronal infections of actinomycotic origin, a faulty diagnosis of alveolar abscess or cellulitis frequently is made.

In addition to the previously mentioned conditions, cervicofacial actinomycosis must be differentiated from tubercular lesions, syphilitic gumma, malignancies, residual osteitis, glanders, tularemia and osteomyelitis.

Diagnosis is based on clinical signs and symptoms and, specifically, discovery of the sulfur granules on direct examination or culture of the exudate for ray fungus. This is accomplished most successfully when the pus is secured from a freshly incised point of fluctuation, since the granules tend to disappear from an abscess which has ruptured spontaneously and has been draining for some time. Failure to find the granules does not preclude the possible presence of the condition. Frequently repeated attempts to find them by direct examination and culture for ray fungus should be made in a suspected case. Microscopic study of sections of biopsy material taken from the sinus tract often will reveal the presence of the ray (granule) when direct examination and culture of the exudate have failed.

12. Boyd, William, *A Text-Book of Pathology*. Philadelphia: Lea & Febiger, 1943.

Pathology

Introduction of the parasite into the tissues under the proper conditions produces cell necrosis and leukocytic infiltration followed by the formation of a cavity filled with pus containing the ray colonies of filaments. Immediately surrounding the cavity is a layer of fresh granulation tissue containing all of the elements of a chronic inflammatory reaction. Biopsy sections of this region reveal the presence of numerous polymorphonuclear leukocytes, mononuclear cells, scattered giant cells and wandering phagocytic cells. These cells are loaded down with fat granules which give the entire mass a yellowish, soft, friable, jelly-like appearance. The outer zone of the lesion consists of an abundance of very dense fibrous tissue. This represents nature's attempt to wall off and localize the process, and it is laid down in such quantity as to produce the characteristic tumor-like mass. This dense connective tissue invades and intersects the lesion so as to form multiple interconnecting abscesses. As the tissue destruction proceeds and the abscesses rupture on the surface, multiple sinuses appear.

Spread occurs by direct extension through the connective tissue and muscle layers. The bony structures rarely are involved. Involvement of the lymphatic vessels and nodes is so rare as to become a good characteristic in diagnosis. On a rare occasion the process may rupture into a blood vessel. A shower of emboli then is disseminated to all organs and the disease may become generalized in nature. Infection may descend to the digestive tract as a result of the patient's swallowing the exudate from a sinus draining intra-orally. Aspiration of the organisms may cause lung abscesses.

Biopsy sections of the lesion are of no diagnostic value unless the characteristic ray colonies can be discerned.

Treatment

There is no specific therapy for actinomycosis. While radical surgery in these cases is contraindicated, difficult, and often results in excessive disfigurement, adequate surgical drainage always is necessary. Wherever possible incision should be made extra-orally in order to prevent the spread of the organisms to the digestive and respiratory tracts through swallowing or aspiration. Until the discovery of chemotherapy, surgical drainage, with the administration of potassium iodide, was the common method of treatment employed, although such substances as copper sulfate, potassium permanganate, sodium iodide, arsphenamine, autogenous and stock vaccines and extracts of lymphoid tissue have been tried with questionable results. In many cases roentgenotherapy was given. The latter method was not employed always. However, in some prolonged cases it finally was resorted to.

With the advent of chemotherapy, sulfonamide derivatives[13, 14] as well as penicillin[14, 15] were given in varying doses. Some clinicians report that the majority of organisms from cases of actinomycosis in human beings proved insensitive to penicillin. Roentgenotherapy appeared to offer good possibilities. However, it is believed that a combination of roentgenotherapy, surgery providing adequate drainage and chemotherapy will give optimum results. Although the administration of potassium iodide recently has been discredited, chiefly because of its

13. Hollenbeck, W. F., and Turnoff, D., Actinomycosis Treated With Sulfadiazine. *J.A.M.A.* **123**:1115 (December 25) 1943.
14. Dobson, L., and Cutting, W. ., Penicillin and Sulfonamides in Therapy of Actinomycosis. *J.A.M.A.* **128**:856 (July 1) 1945.
15. Florey, M. E., and Florey, H. W., General and Local Administration of Penicillin. *Lancet* **7**:387 (March 27) 1943.

tendency to produce painful skin rashes, it is believed that when it is given in large doses within the tolerance of the patient the duration of the disease is shortened considerably. Its chief therapeutic value probably is due to the reduction of swelling resulting from the absorption of granulation tissue which potassium iodide is known to induce. For this very reason, the drug never should be employed where a coexisting tuberculosis is suspected or has been proved present.

Early diagnosis and prompt treatment will lead to cure, while delay can lead to deformity, ankylosis of the mandibular joint, spread of the infection and even death.

The main complication of cervicofacial actinomycosis is false ankylosis of the jaw. The use of cones, gags and continuous exercise during therapy will prevent this.

Draining sinuses should not be allowed to close until cultures are negative on at least two of three tests. However, a cure may be considered accomplished only if a period of six months has elapsed without recurrence of any symptoms.

Roentgenotherapy has proved to be a most useful therapeutic measure. Although radium therapy may be employed, roentgenotherapy is simpler and more effective. In our practice, fractionated deep roentgenotherapy, using HLV 0.9, 200 kv., 5 ma., 0.5 copper filtration, 1 al., gave best results. Small doses, 100 r. to 150 r., measured in air over a field covering the involved area, are given two or three times a week up to 600 r. to 1,200 r. Another course may be repeated in three to four weeks if necessary. Some roentgenologists employ much larger doses, but most agree that smaller doses have proved more effective. Better clinical results are observed and there is no danger of skin changes. The tendency toward scar formation which is so characteristic of the disease is minimized greatly through the proper administration of roentgenotherapy. The scars are smaller, softer, and there is far less contraction.

The mode of action of roentgenotherapy is difficult to explain. The possibilities are:

1. Desjardin's[16] theory of the liberation of antibodies from disintegration of leukocytes locally under the influence of radiation.
2. Vasodilatation locally.
3. Possible direct lethal effect on the organism.

Representative Cases

Five cases with proved actinomycosis were treated in the last five years. All patients were seen after a period of at least eight months had elapsed since the extraction of teeth, with infection following. One patient was seen four years after the onset of infection, and one gave a history of fifteen years' duration.

All cases had incision and drainage, potassium iodide in various doses, roentgenotherapy in small doses and chemotherapy in the form of sulfonamide preparations, as well as penicillin at different times. Three patients had large doses of penicillin intramuscularly and 2 of these had courses of penicillin intravenously. All were suffering from trismus of the jaw when first seen.

The plan of management in all cases was as follows:

1. Adequate continuous drainage.
2. Exercise of the jaw by means of gags, chewing gum and stretching.
3. Large doses of potassium iodide. Should the patient develop a rash, the

16. Desjardins, A. U., Radiotherapy in Actinomycosis. *Radiology* 11:321 (October) 1928.

potassium iodide is discontinued until the rash is cleared. Then medication is resumed.

4. Sulfanilamide and sulfapyridine has been found to be most effective, particularly if cultures showed mixed infection in addition to Actinomyces.
5. Penicillin was employed parenterally in small doses for as long as the infection persisted. Up to 5,000,000 units was given.
6. Roentgenotherapy was given as described previously.
7. Frequent blood counts were taken.
8. General supportive therapy as indicated in each case was prescribed.

All patients have been free of disease for periods of time ranging from six months to three and a half years.

The last 2 patients (case histories 3 and 4) had marked ankylosis of the jaw when first seen. To date, almost complete function has been restored.

Case 1

A boy, aged 13, was referred to the office on March 3, 1941, complaining of a swelling on the right side of the face, which was of three weeks' duration.

Examination revealed a hard indurated swelling, involving the entire right angle of the mandible and parotid region (Fig. 1). There was no fluctuation present. The mucobuccal fold was raised intra-orally, and there was fluctuation in the fold buccal to the lower right second molar. There was moderate trismus. The patient had an oral temperature of 99.6 F. Roentgeno-

Fig. 1, Case 1.—Preoperative appearance of hard indurated swelling of right mandibular region, before the case was diagnosed as actinomycosis

grams showed an unerupted lower right third molar bud, surrounded by a follicular cyst (Fig. 2). A tentative diagnosis was made of acute degenerated follicular cyst around an unerupted lower right third molar.

The patient was anesthetized under nitrous oxide-oxygen, an incision was made in the mucobuccal fold and pus was evacuated. Hot irrigations intra-orally and cold magnesium sulfate packs extra-orally were ordered. It was decided to reduce the acute stage and swelling before removing the cyst and tooth.

Supportive measures were prescribed. The iodoform drains were changed on March 5, 7, 10, 13 and 17. Another point of fluctuation was observed, more anteriorly in the fold. On March 21, with the anesthetic agent nitrous oxide-oxygen, the incision in the mucobuccal fold was extended to include the new point of fluctuation. The oral temperature was 100 F. Drains were changed on March 22 and 24. On March 28 fluctuation was noticed extra-orally.

On March 28, employing the same anesthesia, an incision was made below the lower border of the mandible, at the angle. Pus was evacuated and a drain was inserted. The extra-oral and intra-oral drains were changed every day. The patient was not improving, and it was decided to remove the follicular cyst and tooth. The referring dentist and the child's parents were consulted and consent was obtained.

On April 11 the patient was placed under gas-oxygen anesthesia, and the mucoperiosteum distal to the second molar was incised and retracted. The bone in the retromolar region was found to be perforated, and the buccal plate of the ascending ramus and angle of the mandible was found to be degenerated and connected with the extra-oral incision. The tooth, cyst and degenerated tissue were removed, and through and through drainage was established. The region was dusted with sulfathiazole, and one suture and two drains were inserted.

The tissue was sent for pathologic examination. In the macroscopic description, it was the "opened out wall of cyst sac."

The microscopic description was as follows: "In one section the cyst character of the specimen is confirmed. In others the actual cyst is fragmented.

"The lining epithelium is frayed; nowhere is it characteristically squamous. What is significant is the appearance of 'basal spurs' which have been trapped away from the lumen. In some fields these cells appear as epithelial cords, strands or clusters. In one or two fields keratinization takes place in a single cluster with the formation of an onion body or pearl."

The pathologic diagnosis was "follicular cyst with potential enameloblastic changes in the wall."

Drains were changed on April 14, 15, 17, 19 and 21. On April 23 a new point of fluctuation was noticed just below the inferior border of the ear. This was incised and connected with the

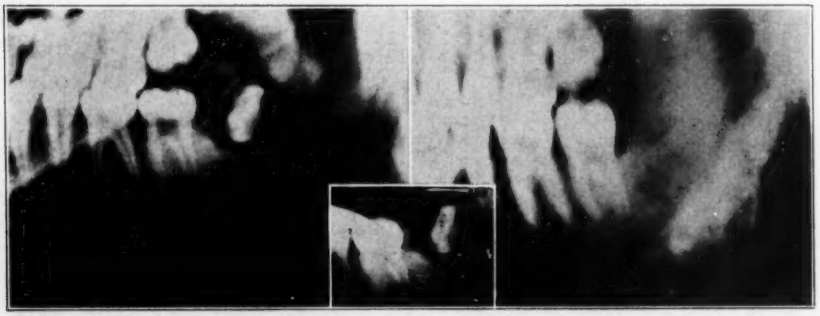

Fig. 2, Case 1.—Left: Preoperative roentgenogram, showing follicular cyst involving the lower right third molar. Inset: Dental roentgenogram. Right: Postoperative roentgenogram, showing complete regeneration of bone

old incision. The sinus was treated with sulfathiazole and drains were changed every third day until May 14, when a new point of fluctuation was noticed extra-orally. It was opened and three drains were inserted.

On June 12, 1941, the patient was referred to Dr. Rieva Rosh for consultation and roentgenotherapy. At that time the swelling extended from the ear lobe to the nasal fossa, and from the zygoma to below the lower border of the mandible, and measured about 8 by 8 cm. in diameter. There was free drainage of suppurating material from all three incisions. Examination of the exudate showed the presence of Actinomyces.

Roentgenotherapy was started on the entire face and neck region, 100 r. in air given twice a week for three weeks. Factors used were 200 kv., 5 ma., 5 copper filtration and 1 al. The swelling was reduced considerably after the third week, and three more weekly treatments were given.

On July 14 a new point of fluctuation developed extra-orally and it was incised. The drains were changed regularly. On July 28 a point of fluctuation developed opposite the tragus of the right ear. It was opened, the old sinuses were also enlarged with a hemostat and four iodoform and sulfathiazole drains were inserted.

The sinuses were kept open. On October 17 and November 13, closing sinuses were reopened in order to maintain drainage. The patient received four roentgenotherapy treatments until the cultures were negative on repeated examination, and then the sinuses were allowed to close. The lesions healed, leaving only a soft scar on the right side of the neck.

The patient was discharged on December 29, 1941, and there has been no recurrence.

Case 2

A white woman, aged 21, came to the office on July 21, 1943, complaining of pain and swelling of the left side of the face, which was of four weeks' duration. The upper left third molar had been removed one week previously by her dentist.

Examination revealed an unerupted lower left third molar with considerable pericoronal infection. Partial trismus was present. The swelling extended from the left malar bone to below the angle of the mandible and involved the left parotid area.

With the patient under gas-oxygen anesthesia, the lower left third molar was removed and a gramacidin drain inserted into the socket. Sulfadiazine was prescribed; internal hot irrigations and external cold wet magnesium sulfate dressings were ordered. The gramacidin drains were changed daily. The patient showed considerable improvement and swelling had subsided greatly. The socket healed normally, and on July 29 the drain was removed. The swelling became worse again on July 31 and became progressively larger. On August 2 sulfadiazine again was prescribed and given intermittently until September 28, with repeated blood counts and urinalysis taken during this period to detect any blood or kidney changes.

On August 13 roentgenograms were taken and proved negative. The swelling continued to enlarge. On September 3 heat was applied externally, in order to point the infection. The hard facial swelling gradually softened with the development of external fluctuation and pointing (Fig. 3). During this period the temperature fluctuated a fraction of a degree above and below 99 F. On September 20 an extra-oral incision was made and a drain inserted. Ample pus was evacuated. A smear and culture were taken, and both proved negative. Sulfanilamide drains were changed every other day. On September 29 the purulent discharge was cultured, and again the report was negative. On October 7 a third smear and culture revealed the presence of a gram-positive pleomorphic micro-organism which resembled Actinomyces bovis.

Penicillin was prescribed and ten injections totaling 1,000,000 Oxford units were administered. The patient was referred for roentgenotherapy. From October 7 to 21, five weekly treatments (100 r. in air) were given. Factors used were 200 kv., 5 ma., 0.5 copper filtration and 1 al. After this, treatment was given once a week, 75 r. for five treatments. An additional 1,000,000 units of penicillin were given; 25,000 Oxford units were administered every three hours. Saturated solution of potassium iodide also was given, 1 dram three times daily. However, at the end of the week the patient developed an iodine rash, and this treatment was discontinued.

Fig. 3, Case 2.—Left: Lesions typical of actinomycosis with discharging fistulae. Right: Slight postoperative scarring. Deep disfiguring scars are prevented by judicious use of roentgenotherapy

Another point of fluctuation developed extra-orally, and on October 15 this was incised, the pus evacuated and through and through drainage was established with the original incision. On October 22 an incision was made and connected with the original sinus, and gramacidin drains were inserted. These drains were changed every second day. On November 19 another point of fluctuation developed, a seventh incision was made and five gramacidin drains were inserted. By February only two sinuses were discharging, the rest remained dry and were allowed to close. Penicillin drains were used in these two sinuses and culture was still positive for Actinomyces.

By February 12, 1944, the previous picture of actinomycosis remained unchanged except for a weeping skin rash which developed from the penicillin. The swelling had become softer. The patient was hospitalized and a third course of penicillin treatment was ordered. The patient showed considerable improvement until April, 1944, when one of the old sinuses began to discharge again. With the patient under gas-oxygen anesthesia, all the sinuses were explored and enlarged with hemostats, penicillin drains were inserted and sulfapyridine was prescribed. On June 16 another point of fluctuation developed, and this was incised and pus evacuated. All sinuses were kept open, and on August 25 there was a spontaneous rupture at the original incision, and two hard nodules developed below it. One of these nodules opened spontaneously on September 11. On November 4 the patient again was hospitalized and 2,000,000 units of penicillin were administered parenterally. By December 21 the swelling had disappeared, and all sinuses were allowed to close after three successive cultures were negative for Actinomyces.

In January, 1945, another course of roentgenotherapy consisting of five weekly treatments (100 r. in air each) was given. The patient remained free from any further swelling, and the sinus closed, leaving a soft scar that is hardly perceptible. The patient was discharged on February 26, 1945.

Case 3

A white man, aged 41, was referred to this office by his dentist on April 18, 1942, for the removal of a lower left third molar. The patient had a hard swelling at the angle of the mandible and considerable trismus. The swelling was of two months' duration. His temperature was 98.4 F.

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The patient was anesthetized under nitrous oxide-oxygen and the tooth was removed. Sulfathiazole was prescribed, extra-oral cold magnesium sulfate applications and intra-oral hot irrigations were ordered. The swelling and trismus did not subside, and on May 5, 1942, extra-oral hot packs were ordered. Fluctuation developed and on May 12 an extra-oral incision was made and a drain inserted. Very little pus was evacuated. The drains were changed on consecutive days, and on June 3 another point of fluctuation about ½ inch from the original one developed. This was incised and connected by means of a hemostat with the first incision. The swelling did not subside, so roentgenotherapy and cultures for actinomycosis were advised.

The patient did not return until April 20, 1945, almost three years later, and gave a history of treatment for chronic parotitis at a hospital since August, 1942. He had received several courses of roentgenotherapy and penicillin during this interim.

Examination revealed swelling, trismus and a discharging fistula still present. A tentative diagnosis of actinomycosis was made and the exudate was cultured. This proved positive for Actinomyces. Roentgenotherapy and penicillin treatment were advised.

From August 13 until September, 1945, the patient received six weekly treatments of 100 r. in air. Factors used were 200 kv., 5 ma., 0.5 copper filtration and 1 al. Due to previous experience saturated solution of potassium iodide was prescribed, 1 dram three times a day together with 1 Gm. of sulfanilamide every four hours and penicillin parenterally, giving 1,000,000 units at this time. At the end of this course of therapy the culture became negative. The sinus was allowed to close. During the course of therapy the patient was given special instruction as to exercise of the jaw. There was greatly improved mobility of the jaw which the patient did not enjoy before admission.

When last seen, three months later, he was able to masticate meat and any other food.

Case 4

A white woman was referred to our office on January 29, 1945, with the following history: The patient had a lower right impacted third molar removed by her dentist during July, 1944. Following surgery she was confined to bed for two days. She had considerable swelling, pain and fever. About ten days later she was referred by her dentist to an oral surgeon who operated intra-orally for an infection of the mandible. She was under the oral surgeon's care until November, 1944. The swelling persisted and she was getting worse. The patient went to a second oral surgeon who treated her for two months, and the swelling became still worse.

Examination revealed a hard, indurated swelling of the right cheek and parotid area, extending from the malar bone, over the parotid gland, in front of the tragus of the ear and below the right angle of the mandible. A tentative diagnosis was made of: (1) actinomycosis, (2) masseter muscle infection and (3) parotitis.

Roentgenographic examination revealed a slight rarefaction of the bone in the lower right third molar area.

Sulfanilamide was prescribed, in conjunction with intra-oral hot saline irrigations and extra-oral cold magnesium sulfate compresses. The patient's condition remained about the same, and on February 10, 1945, 1,000,000 units of penicillin to be administered parenterally was prescribed. She improved considerably with the penicillin treatment, and by February 14 the swelling subsided almost completely. The patient remained normal for about two weeks, then the swelling recurred. On March 24 another 1,000,000 units of penicillin was ordered. The condition showed improvement for about a week, when the swelling returned again.

On April 2 the upper right third molar began to bother the patient and it was removed under nitrous oxide-oxygen anesthesia. The swelling became prominent over the right temporomandibular joint and parotid region. On April 17 a third course of penicillin was prescribed, but the swelling persisted and trismus developed. Hot extra-oral packs were ordered on May 11, and the patient was referred for roentgenotherapy. Sulfanilamide was prescribed again. On May 28 fluctuation developed and an extra-oral incision was made in front of the right tragus, ample pus was evacuated and a tyrothricin drain was inserted. A smear and culture was negative for actinomycosis. Drains were changed daily. On June 5, 1945, a point of fluctuation

developed at the angle of the mandible; an incision was made and connected by hemostat to the old incision. Another smear and culture taken on June 23, 1945, was negative for actinomycosis. The two openings continued to drain profusely, and on August 10, 1945, a smear and bouillon culture proved positive for actinomycosis. Another smear and culture taken on August 22, 1945, also was positive. During the entire period the patient's temperature varied within a degree of 99 F.

From May 25 to July 30 the patient was given eight weekly treatments (100 r. in air). Factors used were 200 kv., 5 ma., 0.5 copper filtration and 1 al. At the same time she was given saturated solution of potassium iodide, 1 dram three times a day; sulfathiazole 1 gr. every four hours, and 1,000,000 units of penicillin, at the rate of 20,000 units intramuscularly every three hours.

The sinus was not allowed to close until three consecutive cultures were negative for Actinomyces. She also was instructed to exercise her jaws by separation with specially constructed wooden blocks and by chewing gum. During this course, the blood count showed some decline in hemoglobin, and she was given twelve biweekly intramuscular injections of crude liver extract.

When the patient was seen last the sinuses were closed, blood count was normal and the incisions had left only soft scars.

Case 5

A man, aged 33, came to the office on June 13, 1945, complaining of an unhealed discharging sinus over the left parotid region and of inability to open the mouth wider than 1 cm. In the fall of 1931 he had had a "stiff jaw" for a few days and was treated by a local practitioner. An impacted tooth was found and removed, and this was followed by an infection at the angle of the jaw. In 1932 the jaw was "scraped." However, the lesion did not heal. In 1936 a biopsy was taken in one of the Southern clinics and revealed actinomycosis. He had received a few roentgenologic treatments and potassium iodide without any results. In 1939 he had had the left coronoid process removed, had received sulfa drugs at that time and had suffered almost complete "lock jaw" since then. In 1944 he had received, intravenously, penicillin continuously, reaching a total of 1,000,000 units.

A culture of the discharge taken on June 13 was positive for Actinomyces. From June 18 to July 30, 1945, the patient received six weekly treatments of 100 r. in air each. Factors used were 200 kv., 5 ma., 0.5 copper filtration and 1 al., together with a saturated solution of potassium iodide, 1 dram three times a day, sulfapyridine every four hours and penicillin intramuscularly, 25,000 units every three hours, with exercise of the jaw by means of chewing and separation by the specially constructed graduated wooden blocks.

Within a week after the last treatment, three successive cultures proved to be negative for Actinomyces. The sinus was allowed to close, and when the patient was seen last in November, 1945, he had regained reasonable mobility of the jaw. He was able to eat solids, chew meat and the sinus healed leaving only a soft scar.

Summary and Conclusions

1. Actinomycosis is more prevalent than hitherto has been supposed. Its etiology has no connection with cattle or agriculture. Hence the city practitioner must be alert to its possible presence in cases occurring with chronic swelling of the jaws.

2. Since the disease occurs most frequently in the cervicofacial region and often follows trauma to the oral tissues, including the extraction of teeth, especially the lower third molar, as was demonstrated in the case reports, the burden of responsibility for early diagnosis rests on the shoulders of the dental profession.

3. In a persistent swelling involving the teeth and jaws, the possible presence of actinomycosis should be eliminated before mass extraction of teeth is resorted to.

UMI

4. Most promising results in treatment appear through a combination of surgical drainage, roentgenotherapy in small dosage, massive doses of potassium iodide up to the point of tolerance, as well as the administration of antibiotics. The sulfa drugs of choice are sulfapyridine and sulfanilamide, and treatment with penicillin has proved beneficial.

5. Roentgenotherapy results in a minimum of scarification and hastens recovery.

6. Cooperation between the oral surgeon and the roentgenotherapist is essential for the successful treatment of actinomycosis.—*57 West Fifty-Seventh Street.*

Amino Acids and Hydrolyzed Protein. Robert Elman, in *Surg., Gynec. & Obst.* 85:113 (July) 1947.

Protein deficiencies in the surgical patient are now recognized as of great clinical importance. Because of this, a variety of methods has been developed for the administration of protein, in addition to the usual normal method by which protein is ingested in the food. For example, the therapeutic value of blood transfusions resides largely in their protein content which, of course, occurs in at least two forms: (1) as hemoglobin within the red blood cells, and (2) as the various plasma protein fractions, particularly albumin. Plasma albumin, because of its large molecular size, exerts an important function in holding fluid within the capillary lumen, and substitutes for it must possess a similar colloidal property. Transfusions of blood and plasma are primarily useful for the immediate prevention or correction of acute deficits following loss of blood or plasma in a variety of surgical patients.

Protein deficiency of nutritional origin presents a different problem. This type of deficiency primarily follows protein deprivation in the diet, and is aggravated by any condition which produces an increased loss of protein tissue. When these patients are unable to ingest and assimilate protein by mouth, the correction or prevention of protein deficiency is found to be impossible unless there is some method available for the introduction of this essential element through the parenteral channel.

Under normal conditions, protein is utilized only after digestion, during which process the large protein molecules are broken down to small building stones, including both single amino acids and small combinations of them, usually called peptides. After absorption into the blood stream, these amino acids and peptides are carried throughout the body to be manufactured into tissue proteins, plasma proteins, hormones, enzymes, etc., each of which has its own characteristic amino acid composition. Should the parenteral channel be required it seems clear that a similar process should be devised. Normal protein nutrition can be maintained only by the assimilation of an appropriate mixture of amino acids, whether it originates from food protein or from protein digests supplied as such either by mouth or by injection.

The April issue of the JOURNAL OF ORAL SURGERY will be received late by its subscribers owing to curtailment of printing schedules resulting from labor-management difficulties in the printing industry. This unavoidable delay is regretted by the Editor.

CANCER OF THE FLOOR OF THE MOUTH

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CANCER OF THE MOUTH, in general, is a subject which may be approached in an optimistic manner. The accessibility of all parts of the mouth for examination and the early awareness of the patient of any change in this region should allow early diagnosis and adequate treatment in a vast majority of cases. It seems that a permanent rate of cure of 90 per cent might be possible with the methods of treatment now in use if every patient with cancer of the lips or mouth could be examined and a positive diagnosis made within a few weeks after the patient first is aware of some change within his mouth.

Psychologic Barriers to Examination

The most unfortunate characteristic of cancer in any region in the body is the absence of pain during the early stages of the disease. This freedom from pain in all incipient cancer except osteogenic sarcoma of bone lulls the victim into a sense of safety and allows delay in seeking professional advice until it is evident even to the patient that his disease is progressive and serious. Because many serious diseases, as well as cancer in its late stages, are associated with severe pain, uninformed patients do not realize that a persistent cold sore on the lip, a persistent ulcer in the mouth or a hard nodule in the neck can be a manifestation of a fatal disease. The early symptoms of cancer of the mouth often are ignored or treated by the patient himself with proprietary drugs or mouth washes until the failure of self medication arouses suspicion. The fear of cancer then may replace the original lack of concern about the early lesion. This fear, based on the common belief that all cancer is incurable, unfortunately often leads to further delay in seeking diagnosis and treatment. Thus, self reassurance, self medication and fear of the unknown lead to delay and late diagnosis of cancer when early diagnosis and early treatment afford the patient's only hope of cure.

Time at best is already short for the victim of cancer when first he notices the earliest manifestation of the disease; and yet even in cancer of the lip, which cannot escape observation, the average delay between onset of symptoms and diagnosis is fifteen months.[1] Until a revolutionary discovery changes the whole plan of treatment, the greatest opportunity for decreasing the mortality of cancer lies in eliminating this loss of time between the onset of symptoms and the consultation with dentist or physician. Fortunately the professions long have been aware of the danger of persistent lesions in the mouth or on the lips, and with free use of modern biopsy technic the diagnosis usually is made within a few days after the patient is seen for the first time. However, in order to promote early consultation it is not only necessary to enlighten the general population on the early manifestations of cancer, but it also is necessary to dispel the universal fear of cancer by publicizing the encouraging results of early treatment.

1. Martin, H. E., and Sugarbaker, E. D., Cancer of the Floor of the Mouth. *Surg., Gynec. & Obst.* 71:347 (September) 1940.

Distinction from Cancer of Tongue

Until recently cancer of the floor of the mouth was not distinguished in the literature from cancer of the tongue. However, the treatment of these two areas has diverged, with the development of roentgenotherapy, so that cancer of the floor of the mouth is predominantly a roentgenologic problem, while surgery still plays a prominent part in the treatment of cancer of the tongue. For this and other reasons it has become customary to discuss cancer of these two regions separately.

The floor of the mouth was described by Ashurst[2] as a crescent shaped area of mucous membrane bounded laterally and anteriorly by the alveolar process of the mandible, and medially by the reflection of the mucous membrane onto the muscular body of the tongue. Posteriorly the floor of the mouth extends to the third molar region. Beneath the mucous membrane in the floor of the mouth lie the sublingual gland, the submaxillary ducts, and the deep portions of the submaxillary glands. The mylohyoid muscle lies below and supports these structures.

Incidence of Cancer on Floor of Mouth

Cancer of the floor of the mouth is a disease of aged men. Hayes Martin, in a study of 103 unselected, consecutive patients who applied to the Memorial Hospital in New York between 1930 and 1934, found that the average age of these patients was 61 years, and that 98 per cent were males. Thus cancer of the floor of the mouth is more exclusively a disease of the male than any other form of cancer which possibly can occur in both sexes. Cancer of the lip and cancer of the tongue also occur chiefly in the male, the incidence being 95 per cent and 85 per cent, respectively. At the Memorial Hospital cancer of the floor of the mouth comprises 17 per cent of all intra-oral cancer and 1.4 per cent of all admissions for cancer. Cancer of the tongue is about one-half as frequent as cancer of the floor of the mouth.

Etiology

The etiology of cancer in the floor of the mouth is even more obscure than in other forms of intra-oral cancer. Chronic irritation must play a relatively minor role here since the floor of the mouth is well protected from trauma. The teeth cannot possibly touch the floor of the mouth, and this area is covered by the tongue in such a manner that food, hot fluids, tobacco or tobacco smoke do not commonly contact the mucous membrane.

Poor oral hygiene with stagnation of saliva containing food debris and bacteria in the floor of the mouth has been proposed as a source of chemical irritation, but since a constant stream of saliva from the submaxillary gland enters the mouth beneath the tongue it is difficult to believe that stagnation of saliva can be an etiologic factor.

Decayed teeth and artificial dentures also have been proposed as a cause of cancer of the mouth by virtue of the mechanical irritation they inflict on the mucous membrane, but Martin, in an excellent study of the subject,[1] finds the incidence of artificial dentures in patients with carcinoma to be no greater than the incidence of artificial dentures in the general population when the same age group is considered. It is a habit of human nature to search for the cause of the

2. Ashurst, A. P. C., Carcinoma of the Floor of the Mouth. *Ann. Surg.* 61:637 (May) 1915.

trouble, and the artificial denture is a handy article to blame. However, if a careful examination is made with the denture in place it is often found that the lesion does not and can not touch the artificial appliance. Nevertheless it must be accepted as fact that a denture which causes a chronic traumatic ulcer may cause cancer to develop in a susceptible person. Therefore all such dentures must be adjusted or discarded.

Carcinoma of the mouth is so predominantly a disease of men that tobacco often has been held responsible for the disease, and indeed it seems certain that "tobacco chewers' carcinoma of the buccal mucosa" demonstrates a clear relationship.

Syphilis predisposes to cancer of the floor of the mouth, for Martin[1] found that 10 per cent of his patients with cancer also had syphilis. This is nearly twice the incidence of syphilis found in a similar age group in the general population. However, this relation is not nearly as marked as in cancer of the tongue where approximately 30 per cent of patients also have syphilis.

Leukoplakia is a less prominent factor in cancer of the floor of the mouth, where it was found somewhere in the mouth in 25 per cent of the patients. In cancer of the tongue 46 per cent of patients, and in carcinoma of the buccal mucosa 70 per cent of patients, show leukoplakia.[1] This association of leukoplakia with cancer also emphasized the role of tobacco as an etiologic factor, for leukoplakia is so commonly connected with smoking that it has earned the name of "smokers' patch."

Diagnosis

The diagnosis of cancer of the mouth is surprisingly easy in the majority of cases seen today, for the lesion usually is extensive and has been present for so long that even the patient feels sure of the diagnosis and merely presents himself to see what can be done to rid him of his disease. But as progress is made in cancer control, diagnosis will become more difficult, for more early lesions will be seen. However, even in early lesions diagnosis can be fairly easy if a biopsy specimen is submitted to a pathologist for study. As a general rule any ulcerative lesion which has persisted for more than three weeks in the mouth of a patient over 30 years of age, and which is not absolutely typical of syphilis, should be considered to be cancer until proved otherwise by biopsy.

A Wassermann examination is always indicated but a positive report does not rule out early cancer, for as noted previously syphilis seems to predispose to tumor growth. Therefore, unless the lesion is absolutely typical of syphilis it is imperative to take a biopsy section of the lesion even in the presence of a positive reaction to the Wassermann examination. Biopsy is absolutely harmless to the patient in any case and may be considered a life saving procedure if it establishes the early diagnosis of cancer and is followed by adequate treatment. A therapeutic test of antisyphilis therapy must never be used to distinguish between carcinoma and syphilis, for the time thus lost, if the lesion fails to respond to medication, never can be regained, and this delay may make the difference between the cure of cancer and an early death for the patient. Biopsy is easily done in all superficial lesions of the mouth with the aid of local anesthesia. A generous section of tissue, preferably containing normal mucous membrane in addition to tissue from the ulcer or tumor mass, should be removed and immediately placed in a bottle containing 5 to 10 per cent formalin or 70 per cent alcohol. In general this specimen should be no smaller than 4 by 4 by 8 mm. Bleeding is easily controlled

UMI

by sutures or silver nitrate or electrocautery. The only accident to be feared in this procedure is hemorrhage due to the opening of a vessel or from attempting to take a biopsy specimen from a hemangioma. The latter possibility seems more dangerous, but this should not occur if the diagnosis of hemangioma is considered. If some doubt exists, an attempt to aspirate blood from the tumor with a fine gage needle should rule out cavernous hemangioma.

Pathologic Factors

A brief although complete case history, a description of the exact area from which the tissue was excised and a clinical diagnosis must accompany the specimen to the laboratory. If the pathologist's report states that no neoplastic cells were seen and if the lesion is strongly suspected of being cancer or fails to respond promptly to therapy, a second biopsy specimen should be submitted for examination, for the inflammatory reaction which accompanies all ulcerative lesions in the mouth may obscure completely the typical picture of early cancer in the first specimen. It always must be remembered that the more certain the diagnosis of cancer the less the possibility of cure.

In addition to its importance in diagnosis, biopsy and microscopic evidence of malignancy are required in any series of cases used for statistical or scientific investigation.

Symptoms

The symptoms of early cancer of the floor of the mouth are, as mentioned above, unfortunately mild, and the usual primary complaint is "sore mouth" of which the patient has been aware for an average of five months. Often these patients state that a lesion which is obviously far advanced has been present for only two weeks, but on further questioning this period is often lengthened to six months or one year. This reluctance to state the exact duration of symptoms is too common to avoid comment.

The earliest lesion consists of an indurated nodule 5 to 10 mm. in diameter lying superficially within the mucous membrane. At this stage there may be no gross evidence of ulceration, and the center of the mass appears to be covered by a thick gray membrane. The margins are glossy, smooth and rolled. The early lesion will show one of two tendencies. The growth may tend to produce a fungating, ulcerative mass extending into the mouth, or it may tend to grow deep and infiltrate the underlying tissues. The latter form seems to grow more rapidly and within three or four months may cause fixation of the tongue and the floor of the mouth to the mandible. The ulcer in this case may remain hidden in the fold between the tongue and the floor of the mouth so that the lesion may be mistaken for an infectious process, and especially so if secondary infection has caused elevations in temperature and white blood cell count. The differential diagnosis must include a consideration of submaxillary duct stone, ranula, herpetic ulcer, leukoplakia, and cellulitis secondary to dental caries or retained root fragment. However, all of these conditions are easily ruled out.

In rare instances, the first symptom of cancer will be a painless swelling of the submaxillary or cervical lymph node. This finding always calls for an examination of the mouth and pharynx including a nasopharyngoscopic examination of the nasopharynx. Such a node also may be the first finding in leukemia or Hodgkin's disease, and therefore careful examination must be made of the opposite cervical region, the axilla and the inguinal region for similar nodes and

of the spleen. If no other lesion can be found it may be necessary to remove the node for microscopic examination. In this case the node must be removed intact and without cutting through the capsule, for this procedure may spill malignant cells into the wound and result in rapid growth and spread of the tumor.

Course

The course of cancer of the floor of the mouth is fairly rapid and follows a fairly constant pattern. The disease usually arises in the anterior portion near the orifice of the submaxillary duct and often spreads across the midline by direct extension. Further growth causes fixation of the tongue to the mandible, and swallowing becomes difficult and painful. Salivation and drooling may occur to cause further discomfort. Metastasis occurs to the submaxillary and cervical lymph nodes, and in untreated cases the patient runs a steady and rapid downhill course.

The histologic grade of cancer of the floor of the mouth is usually not high. Martin[1] found 75 per cent of his cases to be epidermoid carcinoma grade II.

Thirty-four per cent of Martin's 103 patients with cancer of the floor of the mouth had metastatic cervical nodes when first seen, and 24 per cent developed metastasis at some time during the disease. Thus a total of 58 per cent of patients with carcinoma of the floor of the mouth developed metastatic lesions sometime during their lives. This is approximately equal to the incidence of metastasis of lingual cancer. The submaxillary group of lymph nodes is most commonly in-

Fig. 1.—Preoperative view of carcinoma of the floor of the mouth

volved. The incidence of visceral metastasis as determined at autopsy is less than 10 per cent.

Treatment

The treatment of cancer all too often becomes the subject of a debate between the surgeon and the roentgenologist, with each side presenting statistics on the rate of cure obtained in a series of carefully selected early cases of cancer. So many factors, such as location of the tumor, age and general health of the patient, the degree of advancement of the tumor, the radiosensitivity of the tumor, experience of the operator and availability of roentgen or radium equipment, enter into the consideration that no simple rule can be given for treatment.

Each tumor patient must be considered individually in order to determine whether irradiation or surgery is to be the method of choice in treatment. Every case of early cancer should be considered an emergency, and every effort should be made to secure adequate treatment at the earliest possible moment. In certain early cases where the prognosis is excellent and the patient is emotionally stable, it may be wise to inform him of the exact diagnosis. In any case some responsible person in the immediate family should be informed of the diagnosis and advised of the prognosis and the need for prolonged observation following treatment.

By all means the oncologist, who is often a roentgenologist as well as a surgeon, is the logical man to treat these patients, but many patients can not or will not make long trips for this care and therefore must be treated locally. Oral surgeons can and must treat some of these patients if they are to make full use of their opportunity to provide a health service for people who come under their observation. Many patients will not follow advice and seek the consultation of an oncologist for what seems to be such a trivial lesion, and occasionally such a patient will fall into the hands of a consultant who will prescribe inadequate treatment such as a mouth wash for a lesion which rightly was suspected of malignancy.

Treatment of cancer still consists of destruction of the wildly growing cells by surgery, cautery, roentgenotherapy or gamma radiation from radioactive substances. In general it may be said that treatment of cancer of the floor of the mouth has become a roentgenologic problem because of the success of this form of therapy and because of the severe deformity which follows radical surgery in the floor of the mouth. Occasionally however, radical surgery may be used with good results. One widely accepted method of treatment uses roentgenotherapy aimed directly at the lesion through the opening mouth by means of metal tubes 2.5 to 4 cm. in diameter connected to the roentgenologic unit. While the mouth is held open the unit is adjusted so that the open end of the metal tube lies directly over the lesion to be treated. During this adjustment the region is visualized by means of a periscopic device extending through the wall of the intra-oral cone. The average dose is 5,000 to 7,000 roentgens (measured in air) given over a twenty day period. This form of roentgenotherapy, called "perioral x-radiation,"[3] allows a greater concentration of the ionization effect of the rays in the tumor itself. However, even this form of roentgenotherapy may cause devitalization of the mandible. If this should occur the bone may still remain entirely asymptomatic and continue to serve its normal function as long as infection does not occur. If teeth are extracted from a mandible which thus has been

3. Martin, H. E., Perioral X-radiation in Treatment of Intra-oral Cancer. *Radiology* 28:527 (May) 1937.

UMI

damaged by irradiation, however, or if the bone should be exposed by ulceration of the overlying mucosa, osteomyelitis will follow immediately. This results in severe pain, sequestration, and extrusion of all or part of the mandible before healing can occur. Therefore, it is always advisable to extract all teeth from the mandible before starting roentgenotherapy. It also may be necessary to extract the upper teeth in order to allow the perioral roentgen ray cone to be aimed accurately at the primary lesion.

In the management of metastatic cancer in the submaxillary or cervical lymph nodes, which appears after control of the primary lesion, the treatment of choice is usually the surgical removal of all lymph node bearing tissue on the affected side by block dissection. However, if bilateral metastasis appears, it will be necessary to use roentgenotherapy and supplementary gamma radiation from radon seeds implanted directly within the enlarged lymph nodes, for the operative mortality from bilateral dissection of the neck is too high to justify this surgical procedure. If metastatic lesions already are present when the patient first is seen, this plan of roentgenotherapy for the primary tumor plus surgery for the lymph nodes must be changed. These elderly patients cannot stand the reaction from heavy roentgen ray treatment plus extensive simultaneous surgery of the neck. In these cases it is possible to use roentgenotherapy on the metastatic lesion at the same time the primary lesion is being treated.

Complications

The complications of cancer of the floor of the mouth are many and serious. Obstruction of the submaxillary ducts may occur. This will cause swelling and pain in the submaxillary salivary glands whenever food is taken into the mouth. Ascending infection following this obstruction will result in a suppurative adenitis. Hemorrhage often is present, and in advanced cases acute hemorrhage from an eroded vessel may be the cause of sudden death. Pain is a constant factor in advanced cases, and it often is necessary to resort to alcohol injection or resection of a nerve trunk to relieve this pain.[4] Narcotics should be avoided in the early stages if possible.

The prognosis of cancer of the floor of the mouth usually is not good. In general the older patients and those with metastatic lesions when first seen do not have much chance of recovery.

In Martin's group of 103 unselected, consecutive patients, 16 died less than five years after treatment from some condition unrelated to cancer or were lost from the series due to change of residence during this period without recurrence of the tumor. Of the remaining 87 patients constituting his determinate group, 22 (25 per cent) were alive and free of recurrent cancer five years after treatment.

Report of Case

A white man, aged 67, was referred to the oral surgery department of the Geisinger Memorial Hospital on May 9, 1945, complaining of a sore mouth of six weeks' duration.

Examination.—In the mouth there was a fungating ulcerative lesion approximately 1.5 cm. in diameter lying beneath the tongue in the midline of the floor of the mouth (Fig. 1). This lesion bled slightly on mild trauma but was relatively nontender. It had caused no spontaneous pain. The patient had worn dentures for eight or ten years, but these were in good condition and did not come in contact with the lesion when the mouth was closed. He had smoked a pipe

4. Hare, H. E., Poppen, J. L., and Hoover, W. B., Cancer of the Mouth. Care of the Patient Utilizing Prolonged Anesthesia Obtained by Alcohol Injection of Branches of the Fifth Nerve. *New England J. Med.* 214:572 (March 19) 1936.

and cigars for many years, but this lesion was not exposed directly to the smoke and there was no evidence of leukoplakia anywhere in the mouth.

A complete physical examination at admission revealed mild arteriosclerosis and varicose veins in addition to the findings previously described. He never had been seriously ill and, considering his age, he was in excellent condition. His urine analysis was normal and reaction to the Wassermann test was negative. The blood count was as follows: hemoglobin 87 per cent; erythrocytes 4,130,000; leukocytes 6,600; color index 1.06; neutrophils 64 per cent; eosinophils 2 per cent; small lymphocytes 31 per cent and metamyelocytes 3 per cent.

Diagnosis.—Early carcinoma. An operation was scheduled for May 10, 1945.

Operation.—Propylmethylcarbinylallylbarbiturate (Seconal, Lilly) 1½ gr. and atropine sulfate 1/150 gr. was given one hour before the operation. Using 2 per cent procaine anesthesia to block mandibular and lingual nerves bilaterally and using the electrocautery cutting current, the lesion was excised with a 1 cm. margin of normal tissue. This procedure removed a large portion of the ventral surface of the tongue and the floor of the mouth and the anterior portions of the submaxillary ducts.

Bleeding was controlled by fulguration and the entire operative area was heavily fulgurated in order to desiccate and destroy another ½ cm. of normal tissue. A 2 per cent solution of gentian violet then was applied to the wound and the patient was returned to his room in good condition.

Microscopic study of the operative specimen confirmed the clinical diagnosis of squamous cell carcinoma. The lesion consisted of a large mass of undifferentiated squamous cells with enlarged and pyknotic nucleoli. An occasional nucleus was undergoing mitosis. There was a marked tendency toward pearl formation. The pathologic report read "squamous cell carcinoma, grade II."

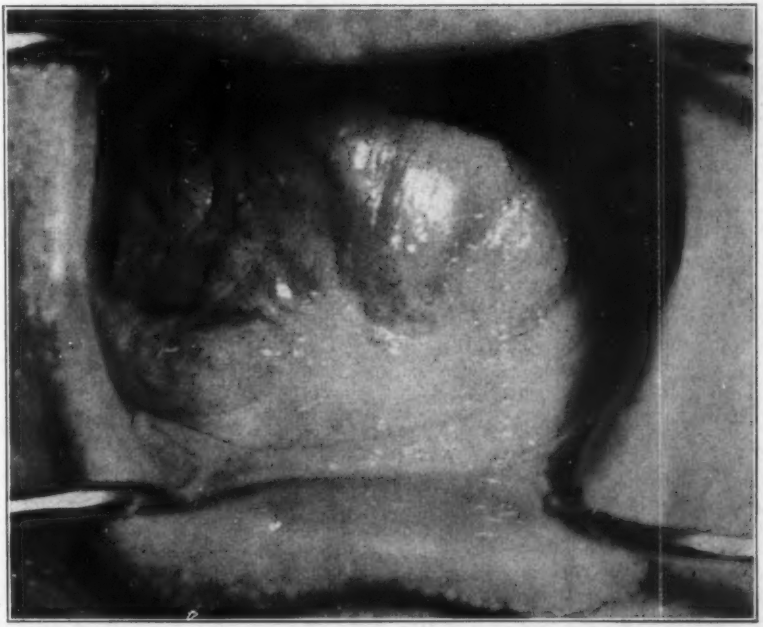

Fig. 2.—Postoperative view of carcinoma of the floor of the mouth

Course.—His postoperative course was remarkably uneventful. He required aspirin 10 gr. for pain on two occasions and was discharged from the hospital on May 11, 1945. Although no palpable submaxillary or cervical lymph nodes were present, he was advised that a second operation for removal of lymph node bearing tissue was indicated as a prophylactic measure against recurrence. (Since the date of this report the policy of this department toward removal of lymph node bearing tissue in the absence of palpable nodes has been changed. Operation is no longer advised unless nodes can be felt.) He was seen for observation at weekly intervals until June 12, 1945, at which time the wound had healed entirely (Fig. 2). At this appointment he was advised to make arrangements to re-enter the hospital for neck dissection. However, he refused this advice, stating that he was too old for further operation.

On August 14, 1945, he returned complaining of painless nontender masses in both submaxillary regions. These masses were approximately 4 cm. in diameter and freely movable. Examination of the floor of the mouth revealed no evidence of the orifices of the submaxillary ducts, and it was suspected that the bilateral swelling was due to obstruction of saliva with resulting distention of the submaxillary glands. However, he was advised that this was a dangerous assumption since the masses could be due to metastatic carcinoma, and neck dissection for removal of lymph node bearing tissue again was advised. This seemed to be the only safe course in view of the evidence at hand. A general surgery consultation was requested and a neck dissection again was advised, but the patient steadfastly refused further operation. On January 26, 1946, he returned again for observation. At this time there was almost no evidence of the submaxillary masses which had been noticed on August 14, 1945. Both submaxillary glands were palpable, but there were no hard nodules present to suggest metastatic lesions.

Summary.—The patient was seen last on January 20, 1947, and there was no evidence of local or metastatic recurrence of carcinoma. By this time it was clear that the orifices of the submaxillary ducts had been obliterated completely by cicatrization following the operation in the floor of the mouth, and that subsequent atrophy of the glandular acini was responsible for regression of the swelling. Although only two years have elapsed since eradication of the primary lesion, it seems likely that this man has been cured of carcinoma of the mouth by early, widespread surgical destruction of the lesion.

The policy of routine prophylactic removal of submaxillary and cervical lymph node bearing tissue in patients who have had carcinoma of the mouth has been abandoned in this department since recent surveys from large tumor clinics indicate that little or nothing is to be gained by the procedure unless palpable metastatic lesions are present in these lymph nodes. However, each case must be given individual consideration, and if the primary lesion is of long standing or if it is felt that the patient will not return for observation regularly, we still may advise neck dissection in the absence of palpable nodes.

Surgery and Roentgenotherapy

The question of whether surgery or some form of roentgenotherapy should be used to treat carcinoma of the mouth must be answered individually in each case. The roentgenologic department of this hospital believes that surgical destruction of the primary lesion including a wide zone of normal tissue is the method of choice if the lesion is small and if the patient is in satisfactory condition to undergo the operation. However, since carcinoma of the floor of the mouth is a disease of old age and is frequently seen in a far advanced state, it often is necessary to resort to roentgenotherapy or interstitial radiation in the form of radium needles or radon seeds.

Any surgeon who attempts to treat carcinoma of the mouth must be thoroughly aware of the seriousness of the condition and must be willing and prepared to undertake a difficult operation in a radical manner. It must be remembered that the first operation provides by far the best chance of a permanent cure

and that if the first operation is inadequate metastasis may occur before local recurrence proves that the first operation was a failure.

Summary

Since time is so important in the treatment of carcinoma, and since it is often difficult to distinguish benign from malignant lesions in the mouth during the early stages, it is wise to take a biopsy specimen of any lesion that does not show a definite tendency toward healing within three weeks of appearance of the lesion. Biopsy may be performed safely in any case. No one ever has been able to prove that biopsy was detrimental to any patient despite the common legend that cutting into a tumor causes rapid spread of the lesion. On the other hand, early biopsy and diagnosis of carcinoma followed by radical surgical eradication of the lesion certainly has saved many lives which would have been lost had a course of watchful waiting been followed.

The importance of early diagnosis and early adequate treatment in cancer of the mouth has been emphasized. The signs and symptoms of cancer of the floor of the mouth have been presented and the treatment of this disease has been discussed briefly. Hayes Martin's five year cure rate has been cited as an encouraging result in the treatment of a form of cancer which has been considered the most malignant of all intra-oral cancer.—*Department of Oral and Maxillofacial Surgery, Geisinger Memorial Hospital.*

Cancer of the Tongue. G. S. Sharp and H. D. Spickerman, in *Am. J. Roentgenol.* 57:181, 1947.

The authors report five year cures in 31.3 per cent of 81 cases of carcinoma of the tongue treated by roentgenotherapy combined with interstitial radium therapy. Excessive smoking and dental trauma to the tongue were considered common etiologic factors. Lingual carcinoma was found to metastasize and infiltrate early. Immediate biopsy and initiation of irradiation was considered important.

The number of five year cures was found to vary with the location, decreasing progressively in the following order: tip, borders, dorsum and base. The more adult type of epitheliomas occurred at the tip, and the anaplastic, high grade, embryonal cell type occurred at the base. Over 90 per cent of all the cases were epidermoid carcinomas.

The authors believed that dissemination of carcinoma cells due to infection was prevented by treatment with penicillin and sulfa drugs. The primary lesion was treated exclusively by irradiation combining roentgen ray therapy with subsequent implantation of radium needles. Whenever possible roentgenotherapy was given through the mouth; however, for lesions at the base of the tongue supplementary external radiation was necessary. By using a short target-skin distance the total dose of roentgenotherapy given by the method described varied from 4,000 to 4,800 roentgens given in from ten to twelve days. Subsequent radium needle therapy was given in the average total dose of 1,200 milligram hour to the anterior two-thirds of the tongue and of 800 milligram hour to the base of the tongue. Soft tissue breakdown and osteonecrosis was minimized by this method.—John R. Lindsay, in International Abstracts of Surgery, *Surg., Gynec & Obst.* 85:230 (September) 1947.

UMI

TWO NEW HEMOSTATIC AGENTS, USED ALONE AND WITH AIDS

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IN A STUDY PREVIOUSLY REPORTED,[1] it was demonstrated that a new agent, oxidized cellulose, was a valuable aid in dental hemostasis. This conclusion was based on the results of its use observed in 80 cases of hemorrhage.

Frantz and Putnam[2] previously have reported their experience with this material. This study and one previously reported by the author was undertaken to test the effectiveness of oxidized cellulose in the control of hemorrhage in the oral cavity. In addition, experience with another material, Gelfoam (The Upjohn Company), used in conjunction with thrombin, is included here.

As used in this investigation, the cellulose is long fibered cotton, sterilized by formaldehyde and packaged in the form of cotton and gauze. Both products are slightly harsher to the touch than the unoxidized material, but readily absorbable, free of nitrogen and slowly soluble in the 0.15 molar solution of sodium bicarbonate with a pH that approximates that of blood.[3] Furthermore, the oxidized cellulose is relatively nonirritating, and implants of it are absorbed in varying lengths (four to forty-three days) of time, depending on the tissue involved, the amount introduced into the wound and the operative trauma.[1]

This report is based on the results observed in 14 cases not included in the previous report.

Hemostatic Agents Previously Used

Since 1938, beef thrombin has been used clinically to accelerate clotting and to promote hemostasis. Its repeated use in man failed to produce detectable antibodies and has never caused sensitization.[4]

During the war, as a result of studies on fractionation of human plasma, human thrombin became available and with it human fibrin foam designed to be used as a carrier of human thrombin. It is an absorbable, nonirritating material.[5–8] Because fibrin foam was a product of human blood and its processing a difficult and expensive procedure, investigations were undertaken to find materials of similar properties.

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Gelfoam

The first suitable material found as a substitute for human fibrin foam was the gelatin sponge. This was developed by Correll and Wise.[9] It is a spongy substance of partially denatured gelatin, known as Gelfoam.

Gelfoam is a glistening, white, porous mass supplied in strips about ½ inch by ¼ inch by 3 inches in size. When dry it can be cut easily with a scissors or a sharp knife. When moistened with thrombin solution it becomes absorbent and pliable; when wet it adheres readily to the bleeding tissue. It is reported that it forms an actual patch on the injured surface after it is held in place for a few moments.[10]

As a carrier for thrombin it is excellent. Its special physical properties and spongelike character make it superior to fibrin foam as a thrombin carrier. Furthermore, 1 cc. weighs 9 mg. but will absorb nearly 0.5 Gm. of water or blood (45 times its weight).[11] Light[12] reports that digestion studies with a standard pepsin solution have shown that digestion occurs in thirty minutes, a value similar to that of fibrin foam.

Light and Prentice[11] state that Gelfoam, when applied to a bleeding surface, soaks the blood into its own interstices, so that the clot formed is largely in the Gelfoam, and no thrombin spreads into any opening vessel, thus giving Gelfoam a decided advantage as a vehicle for thrombin over any carrier previously employed.

After a number of trials for the best method of handling the Gelfoam and thrombin, in cases of oral hemorrhage, a simple but satisfactory technic has been developed.

Method of Application

A strip of Gelfoam is cut into a number of pieces of suitable size, usually ¼ inch square, using a pair of pliers to hold it while cutting with a scissors. These pieces are put into a convenient tray while preparing the thrombin solution. The thrombin is available in a small sealed vial as a white, crystalline powder. The rubber stopper is sterilized by painting with iodine, allowed to dry and then swabbed with alcohol. Two cubic centimeters of sterile distilled water is injected into the vial with a Luer syringe. Without removing the syringe, the contents of the vial are shaken until the solution is clear. The solution is withdrawn into the syringe and expelled into a sterile 1 ounce glass. Pieces of Gelfoam are immersed in the thrombin solution and permitted to absorb as much of it as possible. They are withdrawn, squeezed and kneaded with pliers to expel excess solution and air and to soften the material until it is rubbery in consistency. The Gelfoam again is placed in the thrombin solution until the pieces have absorbed the maximum amount of thrombin.

The pieces of thrombin-soaked Gelfoam are carefully inserted into the sockets of recently extracted teeth or bleeding areas in sufficient number to fill the wound. They are packed lightly. The surplus solution exuding from the packed area is sponged off carefully with a pledget of gauze or cotton lightly dipped in the thrombin solution. The pledget is left on for about ten seconds while the

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underlying Gelfoam swells with blood and the clot forms. The pledget carefully is loosened and peeled off.

The thrombin-carrying Gelfoam acts like a sponge, but only after blood has flowed into it and the clot is established. As emphasized by Light,[12] blood must flow well through the matrix if it is to be utilized fully. When the outer surface of the Gelfoam remains colorless after hemostasis, it may be due to the Gelfoam being too thick, to an overconcentration of thrombin solution in a particular instance or to retardation of bleeding due to excessive pressure.

As in the previous study,[1] a chart was used for all the cases studied. Pertinent data were recorded, either prophylactically or postoperatively. A facsimile of the chart can be found on page 39 of the January, 1948, issue of the JOURNAL OF ORAL SURGERY.

Types of Cases Studied

Purpura	2
Anemia	1
Addison's disease	1
Leukemia	1
Hemophilia	2
Secondary hemorrhage	7
Total	14

The cases were treated by several operators. At times it became necessary for a second trial with another agent after the first did not control the bleeding satisfactorily. As a result, the analysis of the 14 cases in Table 1 will not show the equal use of these agents.

Discussion of Results

In reviewing Table 1, it would seem that there was little, if any, difference between the results obtained in the use of oxidized cotton as compared to Gelfoam with thrombin. In fact, the oxidized cotton was used in more of the selected cases than the Gelfoam. The principal reason for this was that the cotton requires no preparatory procedure and was therefore more quickly available for use.

As observed in the earlier study with oxidized cotton,[1] the sockets or regions packed appeared engorged and in several instances ecchymosed. The clot gave a gelatinous appearance and had a tendency to extrude from the socket in 2 instances. None of the patients complained of pain. The response of these special cases to the use of the oxidized cotton compares favorably with the 80 previously reported hemorrhage cases.

In the patient with purpura (case 2), when the Gelfoam with thrombin was used the hemostasis was favorably comparable to the response when the cotton was employed (case 1). In fact, the healing occurred more rapidly without the accompanying swelling and ecchymosis observed frequently when the cotton was used. No pain was reported.

One patient (case 6) in whom the Gelfoam was used responded as favorably as the one (case 13) in which the oxidized cotton was employed, plus the additional fact that swelling and ecchymosis usually associated with the use of the cotton were lacking. Healing was reasonably rapid, certainly superior when compared to the cases previously observed when neither the cotton nor Gelfoam

were used. Furthermore, it is interesting to note that case 6 required one transfusion, whereas case 13 had two. The transfusion undoubtedly had a bearing in aiding hemostasis. More case reports are needed to ascertain whether Gelfoam with thrombin reduces the number of transfusions required.

In case 4, where both agents were employed, the superior tissue response to the Gelfoam with thrombin was observed readily. Both materials proved satisfactory as hemostatic agents; the normal appearance of the tissues and rapid healing when the Gelfoam was used were considered advantages.

The patient with leukemia (case 5) was a difficult one to control. Use of the oxidized cotton failed to stop bleeding. Hemostasis was obtained with the use of the Gelfoam with thrombin. Because of the patient's generally inflamed gums, no comparison could be made as to the local tissue reaction to the two agents.

It would appear, therefore, that in these special instances Gelfoam was of superior value in some cases of primary, and also secondary, dental hemostatic control. This apparent superiority was attributed to the quicker healing observed, lack of any marked ecchymosis, swelling or continuous (even though slight) bleeding. As in the use of oxidized cotton, no pain was observed.

Analysis of Clinical Cases

The following are 8 cases representative of those studied, analyzed in detail.

Table 1.—Analysis of the cases, showing use of hemostatic agents

Case	Diagnosis	Hemostatic agent	Preoperative	Post-hemorrhage	Results
1	Purpura	Oxidized cotton with snake venom	Yes	...	Satisfactory hemostasis
2	Purpura	Gelfoam with thrombin	Yes	...	Satisfactory hemostasis
3	Secondary anemia	Oxidized cotton	Yes	...	Satisfactory hemostasis
4	Addison's disease	Oxidized cotton followed by Gelfoam with thrombin	...	Yes	Poor hemostasis; Gelfoam used to control bleeding successfully
5	Leukemia	Oxidized cotton followed by Gelfoam with thrombin	Yes	...	Poor hemostasis; Gelfoam used to control bleeding successfully
6	Hemophilia	Gelfoam with thrombin	Yes	Yes	Slow hemostasis; one transfusion also given
		Oxidized cotton	...	Yes	
7	Secondary hemorrhage	Oxidized cotton	...	Yes	Satisfactory hemostasis
8	Secondary hemorrhage	Oxidized cotton	...	Yes	Satisfactory hemostasis
9	Secondary hemorrhage	Oxidized cotton	...	Yes	Satisfactory hemostasis
10	Secondary hemorrhage	Oxidized cotton	...	Yes	Satisfactory hemostasis
11	Secondary hemorrhage	Oxidized cotton	...	Yes	Satisfactory hemostasis
12	Secondary hemorrhage	Oxidized cotton	...	Yes	Satisfactory hemostasis
13	Hemophilia	Oxidized cotton	Yes	Yes	Slow hemostasis; two transfusions given
14	Secondary hemorrhage	Oxidized gauze	...	Yes	Satisfactory hemostasis

Case 1

History.—A white woman, aged 44, gave a history of thrombocytopenic purpura, with a splenectomy on March 3, 1945.

Operation.—The patient came to the oral surgery department for extractions on February 6, 1946. The platelet count had been fluctuating between 6,000 and 30,000 for several weeks prior to this date. Two teeth were extracted and the sockets were packed with oxidized cotton. Hemorrhage was controlled.

Course.—The case was seen again two days later, and some bleeding from the sockets was observed. Oxidized cotton was inserted and the hemorrhage was controlled. On the twelfth day, two additional teeth were extracted and oxidized cotton was used again. On the thirteenth day, the clot was well organized, of good color and gelatinous in appearance. The tissues appeared spread as if the cotton had expanded. Healing of these sockets was uneventful.

Thirty-four days (March 12) following the first extractions, three additional teeth were extracted and the sockets were packed with oxidized cotton. Again there was some engorgement and swelling around the sockets. The patient was seen on March 13, 14, 15 and 16. There was a marked ecchymosis of the palate adjacent to the sockets.

Her recovery was uneventful. On April 2, two more teeth were extracted and the sockets were packed with oxidized cotton. These two sockets healed quickly and uneventfully.

On May 14, the last two teeth were extracted and the sockets again were packed with oxidized cotton (Fig. 1, left). The sockets were engorged several days later and the clot appeared glossy and fairly well formed. Healing was uneventful (Fig. 1, right).

Case 2

History.—A white man, aged 52, gave a history of chronic thrombocytopenic purpura, for which a splenectomy had been done in June, 1945. He was seen first in the oral surgery department for an extraction on May 2, 1946.

Operation.—Although there was a platelet count of only 30,000, the upper right first molar was extracted on May 28. The socket was packed with Gelfoam with thrombin.

Course.—The patient was seen three days later and his condition was good. The tissues adjacent to the extraction site appeared normal in size and general appearance with no sign of

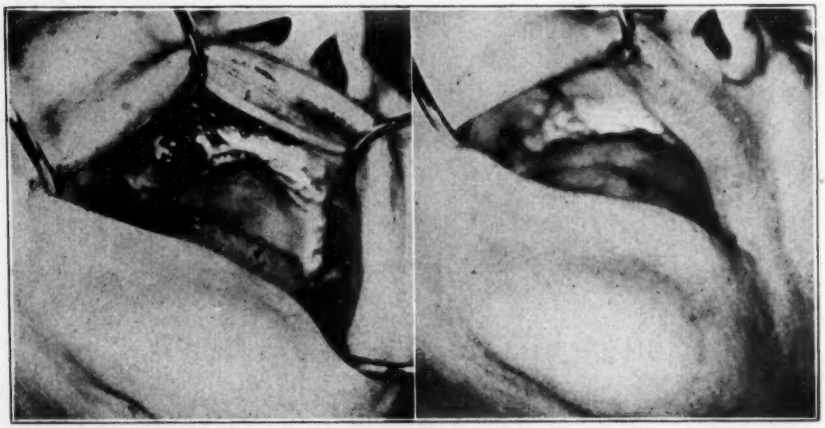

Fig. 1, Case 1.—Thrombocytopenic purpura. Left: Sockets shown immediately after extractions and insertion of oxidized cotton. Note the glossy, pluglike appearance of the clot. Right: Appearance of the healed socket two weeks later. Note normal tone of tissue

bleeding, pain or discomfort. On the eighth day, the wound was well healed. A further extraction was done on this date and the socket again was packed with Gelfoam with thrombin. Thirteen days after the extraction, the socket was well healed and completely normal in appearance.

Case 3

History.—A colored woman, aged 42, was seen first in the oral surgery department on May 17, 1946. She came in for extractions and gave a history of profuse hemorrhage following previous extractions. A check of the medical history disclosed a secondary anemia plus an attack of rheumatic fever two years previously. A blood count at this time revealed the following: hemoglobin 9.9 Gm. (68 per cent); erythrocytes 3,930,000; leukocytes 7,000; polymorphonuclears 66 per cent; lymphocytes 32 per cent, and monocytes 2 per cent.

Operation.—On May 17, two upper teeth were extracted and the sockets were packed with oxidized cotton. Three days later when the patient was seen again, there had been no bleeding following the extractions and the oxidized cotton packing was missing, leaving denuded bone and a painful socket. The socket was treated with the usual postoperative sedatives and was fairly well healed one week later.

Case 4

History.—A white man, aged 55, had been attending the medical clinic for the treatment of Addison's disease and appeared on May 14 for extractions. He was referred to the oral surgery department.

Operation.—On May 14, the upper left central incisor was extracted. Hemorrhage was controlled partially by the patient biting on a gauze pack. The region still was bleeding slightly the next day. The socket was packed with oxidized cotton and the bleeding stopped. The patient returned two days later and had two additional teeth extracted. Again the sockets were packed with oxidized cotton. They healed uneventfully.

On May 24, two more teeth were extracted and again oxidized cotton was used. As a slight ooze continued, more oxidized cotton was applied on the third day. Owing to unsatisfactory healing and oozing, the old clot was removed on the fifth day, the socket irrigated and a fresh packing of Gelfoam with thrombin was inserted lightly into the socket. The bleeding ceased promptly. On the seventh day, an additional tooth was extracted and cotton inserted. A slight ooze continued for two days but stopped spontaneously. Further extractions were done several days later, the same hemostatic agent was used and healing was uneventful.

Case 5

History.—A white woman, aged 46, gave a history of spontaneous bleeding from gums. She was seen first in the oral surgery department on June 4, 1946. Examination of the medical history disclosed a chronic lymphatic leukemia.

Treatment.—The patient was referred to the oral surgery department because of profuse bleeding from the gums. This was particularly severe in lower left second and third molar region and was of a week's duration. The interdental space was packed with oxidized cotton. Because of her previous hospital history she was referred to the overnight ward for a transfusion. Owing to improvement in the patient's general condition, she was given radioactive sodium the next day and was permitted to go home, with instructions to return in one week.

When again seen on June 11, there was still bleeding from the same region, and she was transferred to the overnight ward. The interdental areas were packed this time with Gelfoam with thrombin and the oozing perceptibly diminished. The radioactive sodium given one week previously might have had a favorable bearing at this time.

She was seen on June 13, and as oozing still persisted, the region was repacked with Gelfoam with thrombin. When seen fourteen days following her first visit, the bleeding had stopped, but the gums appeared swollen and were tender to touch. The patient's temperature was up to 103 F. The hemoglobin count was lowest for some time (3.5 Gm.), and no neutrophils were

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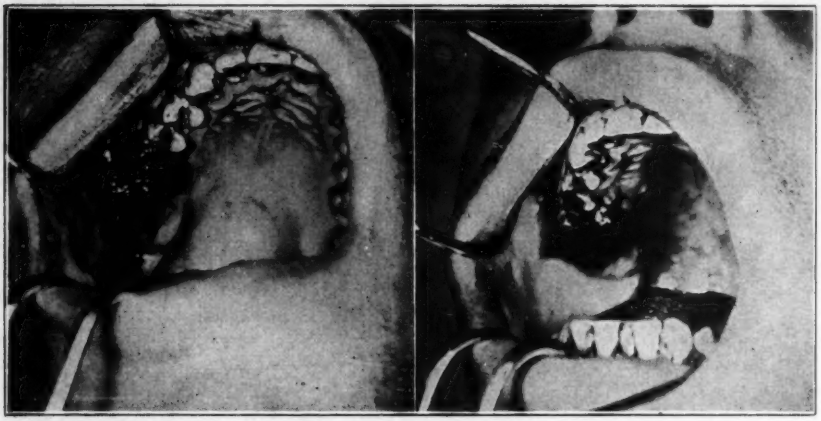

Fig. 2, Case 6.—Hemophilia. Left: Sockets shown immediately after extraction and insertion of Gelfoam with thrombin (July 9, 1946). Right: Condition of socket two days later, showing organization and size of clot (July 11, 1946)

present. Careful mouth hygiene was prescribed with little use of the toothbrush to avoid bleeding. Bleeding of the gums started again on July 11, and the patient was re-admitted to the hospital. The diagnosis at this time was that of lobar pneumonia in the upper left lung. Four days later the patient's condition seemed to be improving with the use of penicillin. On the eighth day, however, the patient died of lobar pneumonia.

It is rather difficult to evaluate the use of the hemostatic agents for this patient, but Gelfoam with thrombin appears to have had a definite positive effect.

Case 6

History.—A white man, aged 19, was seen first in the oral surgery department on June 25, 1946, for an extraction. Because he gave a history of hemophilia, he was referred to the medical clinic for an examination. On the basis of the medical consultation, he was referred back to medicine with the suggestion that he be admitted to the overnight ward for the purpose of receiving a transfusion prior to the extraction and then kept under observation until any danger of bleeding had passed.

Treatment.—The patient was admitted to the overnight ward on July 8. He was given a transfusion and referred to the oral surgery department. On July 9, with the use of local anesthesia, the upper right first molar was extracted. The socket was packed with seven pieces of Gelfoam with thrombin (Fig. 2, left). When seen on the next day, the clot was extruding slightly from the socket. No bleeding or oozing was present. There was a slight oozing during the night. On the second day, the clot appeared glazed, gelatinous and fairly well organized (Fig. 2, right). The patient claimed no discomfort. There was, however, a slight ooze in the lingual gingival region, control of which was attempted by putting a strip of Gelfoam with thrombin against the bleeding area. A prompt, favorable control was obtained.

About one-half hour later, however, the Gelfoam strip fell off and surgical gauze saturated with snake venom was substituted in an attempt to control the slight ooze which still persisted. The gauze did not stay in place, and on the third day another piece of Gelfoam with thrombin was placed over the socket and an attempt was made to keep it in place with dental floss tied to the adjacent teeth. This did not stay in place after twenty-four hours, but bleeding was controlled.

No bleeding occurred on the fifth day. On the sixth day, however, oozing started again and

the clot appeared to extrude slightly from socket (Fig. 3, left). This was easily stopped by applying shreds of oxidized cotton.

On the seventh day, a large, massive clot was hanging out of the socket. There was no bleeding nor pain. By the tenth day, the clot had shrunk in size and still there was no bleeding. On the eleventh day, the sutures were removed, accompanied by some slight bleeding. Oxidized cotton was applied, a modeling compound splint was placed over the cotton and a Barton bandage was applied. When the patient was seen on the fourteenth day, the socket was healing well, with no bleeding present (Fig. 3, right). The Barton bandage was removed. Pressure apparently had a bearing on control of the hemorrhage, but the other hemostatic agents, particularly the Gelfoam with thrombin, were the prime factors.

Case 7

History.—A white man, aged 34, had no previous history of bleeding. He came to the oral surgery department on July 5, 1946, for extractions.

Treatment.—On July 5, the upper right first and second molars were extracted, and the first and second bicuspids. There were no complications. The patient returned on the sixth day after extraction with bleeding from a second molar socket. This was packed with oxidized cotton and the bleeding stopped shortly. When seen again on the eleventh day, the patient stated that the bleeding had stopped promptly and he had no discomfort. The socket looked well and was healing normally.

Case 8

History.—A Negro woman, aged 23, was seen first in the oral surgery department on October 15, 1946, having been sent by her local dentist. On October 14, he had extracted the upper left first molar. Following the extraction the bleeding could not be stopped by the dentist. He referred the patient to our clinic for attention. An examination was made, and the following was noted: "The buccal vestibule, left side, is a mass of blood clot. On removal there appears to be hemorrhage from gingiva around upper left first molar socket, especially at the distal margin." The patient also gave a history of hemorrhage following previous extractions.

Treatment.—Remnants of the old clot were removed, gingival bleeding points were packed

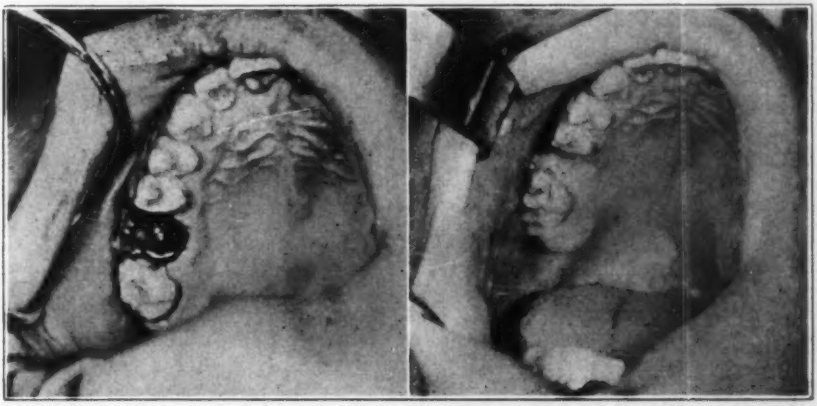

Fig. 3, Case 6.—Left: Six days after extraction bleeding had started again and had been stopped by oxidized cotton (July 15, 1946). Right: Fourteen days after extraction excellent healing could be observed (July 23, 1946)

with oxidized cotton and gauze was packed on top for pressure. The bleeding was controlled after fifteen minutes.

Course.—When the patient was seen again on the third day, there had been no bleeding. There was quite a bit of swelling with induration in the mucobuccal fold. The patient did not return for further observation.

Summary

The cases outlined in this study, as previously mentioned, were but a few selected ones out of a total of about 100. They were selected because of their special hemorrhage problems or because they were representative of complicated cases of bleeding.

Oxidized cellulose, particularly in the form of cotton, was found to control bleeding in a tooth socket quickly. It formed a gelatinous mass which in most instances became separated in several days or gradually disappeared. The sockets, however, generally gave an appearance of enlargement, but this actually was an expansion of the adjacent soft tissues.

It seems that the cellulose has a marked tendency toward expansion. This, in addition to the fact that the operative region becomes engorged with blood, helps create the expansion and extrusion of the clot. Trauma usually due to the opposing teeth may cause a breakdown of the clot at times.

Because of the breakdown of the clot, topical pressure in the form of a modeling compound splint was applied in several cases to prevent the expansion of the cellulose or the clot, with a subsequent disintegration. Apparently this procedure is advantageous, for it reduced the marked swelling and healing was hastened.

In a number of instances, ecchymosis was noticed around the adjacent tissues. No systemic reactions were noted, except in 1 case, and in this instance it was felt to be caused by the extraction itself. Following the first stage of engorgement of the socket, healing as a rule followed quickly.

Gelfoam with thrombin required some manipulation before using. This is only a factor in technic and does not minimize its good features. It is absorbed easily by the tissues. It stops bleeding readily and in some of the cases under observation succeeded where the oxidized cellulose failed. That there is no visible tissue reaction is indicated by the lack of any swelling of the sockets. None of the patients complained of any systemic reaction. Healing, as a rule, was prompter and more normal than with oxidized cotton.

Conclusions

Two satisfactory and practically nonirritating foreign materials for the control of dental hemorrhages were tested. To date they have been found to be the best of the various hemostatic agents available for this particular field.

Despite the fact that oxidized cotton was used in more cases, Gelfoam with thrombin, of the two agents, appeared to be better than oxidized cotton in these special types, because of its superior ability in controlling hemorrhage, a smaller incidence of swelling, no ecchymosis and no visible tissue reaction.

Its one drawback, as compared to the oxidized cellulose, is the need for freshly preparing the thrombin solution before use.—*116 Clinton Street.*

UMI

METHODS OF FIXATION OF JAW FRACTURES AND THEIR INDICATIONS

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Boston

IN MILITARY as well as in civilian life, fractures of the jaw play an important part in the practice of the oral surgeon. Many of these fractures are multiple or compound and may be complicated by fracture of the teeth, by infection or by the absence of teeth which eliminates the most simple type of fixation, intermaxillary wiring.

The methods to be described are important for the treatment of such fractures, especially those that resist the ordinary methods of reduction and present difficulties of fixation and immobilization. While some of these methods are new, having been developed during the last few years, others are old and have been revived. The substitution of new materials or the prophylactic use of antibiotics has eliminated the complications for which the older methods were discarded. The methods to be described are: transosseous wiring; the use of bone plates; internal wiring fixation; transfixation with Steinmann pins, and skeletal fixation with pins and clamps.

Transosseous Wiring

Transosseous wiring, a method condemned in the past by most writers, has been used by me successfully in many cases during the last few years. The failures described in the literature no doubt were due first to the type of wire used, to improper immobilization and to sepsis. With the advent of stainless steel and tantalum, which are biologically inert, and the prophylactic and therapeutic use

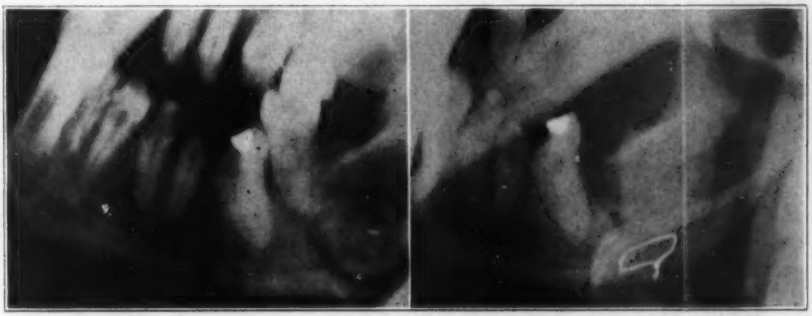

Fig. 1.—Left: Roentgenogram showing fracture of the mandible at the angle with displacement. The tooth in fracture line is to be extracted. Right: Postoperative view showing tooth extracted and fracture fixed by transosseous wiring. The mandible was fixed by intermaxillary wiring of the anterior teeth

Presented before the Section on Oral Surgery, eighty-eighth annual meeting of the American Dental Association, Boston, August 7, 1947.

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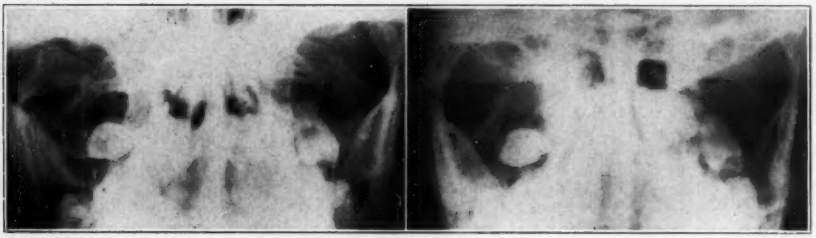

Fig. 2.—Left: Preoperative roentgenogram showing dislocation by fracture of mandibular condyle. Right: Postoperative view showing reduction and fixation by transosseous wiring

of penicillin, two of the dangerous factors have been removed. A thorough understanding of this method will make it clear that transosessous wiring should be used only to hold the fragments in the reduced position so that they cannot be displaced by muscular pull. It should not be relied on to immobilize the fracture. It is my opinion that the main reason transosseous wiring has failed in the past was due largely to disregard of this fact. Any fracture of the mandible reduced and fixed by this method also must be immobilized by intermaxillary wiring, the use of a Gunning splint with craniomandibular fixation or bandages.

The method consists of (1) adequate exposure of the fracture from an extra-oral approach; (2) the drilling of a hole in each fragment; (3) reduction of the fracture under direct vision, and (4) fixing the fragments in position by means of a stainless steel wire (24-26 gage) drawn through the holes and twisted. In other

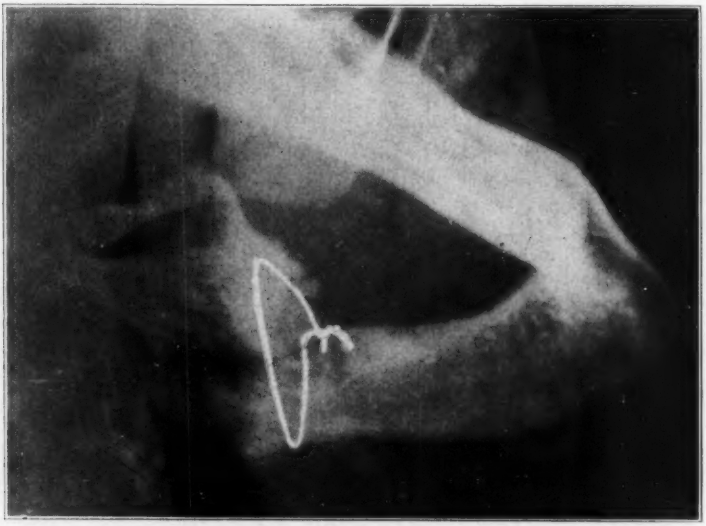

Fig. 3.—Postoperative roentgenogram showing horizontal fracture of ramus with combination of transosseous and circumferential wiring

cases the wire may be inserted through a hole in one fragment and drawn around the periphery of the other, as for example in the case of a horizontal fracture through the vertical ramus (Fig. 3). After the wiring is completed, the wound is closed in layers and the jaw immobilized.

Indications for Transosseous Wiring.—This method, not to be used in septic fractures, is of special value in the following cases:

1. Fractures at the angle of the jaw with upward or lateral displacement of the ramus (Fig. 1, left and right). It is superior to the splint with extension arm pressing the ramus back and superior to the traction method with a wire inserted in a hole at the angle of the jaw attached to a rod extended from a head cap.
2. Fractures in any edentulous section of the horizontal ramus of the mandible which tend to become displaced.
3. Fractures at the neck of the condyle with overriding of the fragments or complicated by dislocation (Fig. 2, left and right).
4. Fractures of the ascending ramus of the jaw. In some instances, transosseous wiring at the angle will take care of vertical fractures, while a combination of transosseous and circumferential wiring will give satisfactory results in horizontal ones (Fig. 3.)
5. Small facial fractures, such as those involving the orbit, may be fixed through small incisions by means of 26 gage wire sutures.

Use of Bone Plates

More secure fixation can be obtained by means of bone plates than is possible by transosseous wiring. Wiring mainly prevents distraction of the fragments, while plating also eliminates overriding and vertical displacement, especially if four screws, two in each fragment, are used. As in the case of wiring, a plate alone should not be relied on for the immobilization of the fracture; intermaxillary fixation should be applied.

The plates used are small metacarpal or Sherman plates which are attached after exposure and reduction of the fracture, through an external incision (Fig.

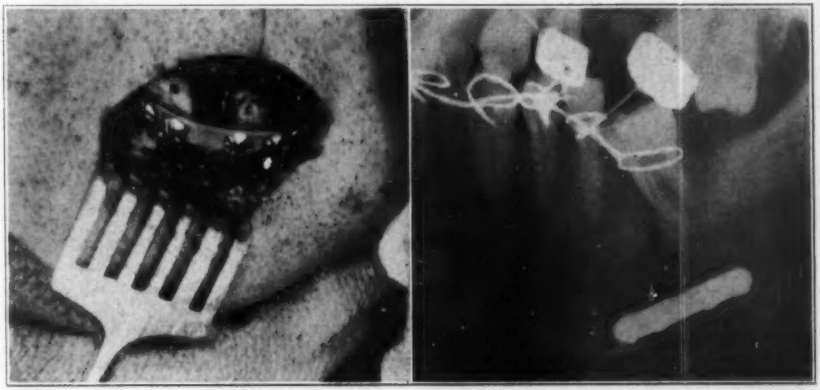

Fig. 4.—Left: Use of a Sherman bone plate in a case of fracture with loss of bone to be treated by drilling of the cortex and the insertion of bone chips. Right: Postoperative roentgenogram showing fixation with bone plate and intermaxillary fixation for immobilization of the mandible

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4, left and right). The plate and the screws should be of the same metal, namely Vitallium or stainless steel. The screws may be short and extend only through the cortex upon which the plate is placed, or long enough to engage both cortices. If long screws are used, the plate must be applied close to the inferior border of the jaw, so as not to injure the mandibular nerve. Bone plates do not have to be removed unless they are close to the skin where they would annoy the patient.

Indication for the Use of Bone Plates.—Bone plates may be used in the following types of cases:

1. Fractures in edentulous sections of the jaw, especially those that are oblique with the tendency to override.

2. Fractures with loss of bone due to osteomyelitis and nonunion, or the correction of malunion with shortening of the fragments due to freshening of the fractured ends. Space between the fragments may be filled in with bone chips. If a large segment of the mandible is lost, a bone graft might be indicated (Fig. 3).

3. Fracture dislocation of the condyle may be fixed by means of a three-hole plate. This is to prevent the reduced condyle from slipping out of the glenoid fossa while the jaw is manipulated and immobilized.

Bone plating, like transosesseous wiring, must be supported by immobilization. Reliance on the bone plate alone for fixation of the fracture in most cases will end in failure because of undue strain brought on it during the functional movements of the jaw.

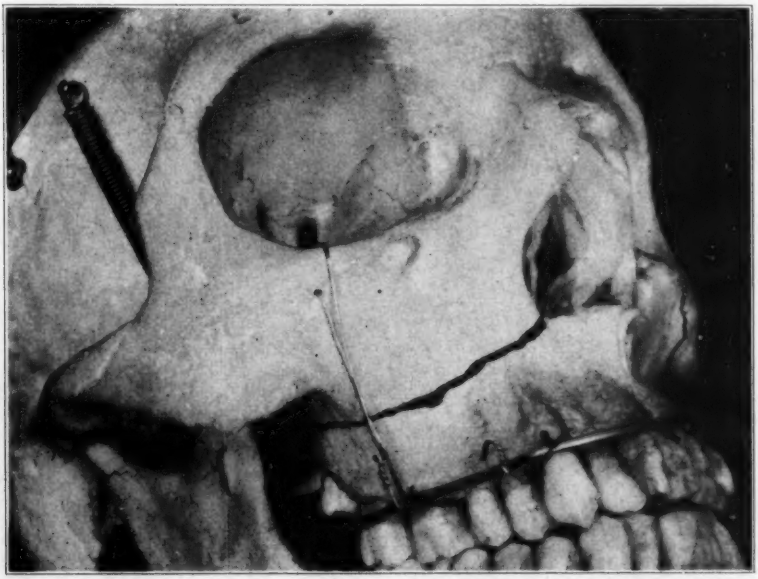

Fig. 5.—Skull showing the use of internal wiring fixation of a horizontal fracture of the maxilla (Adams' method)

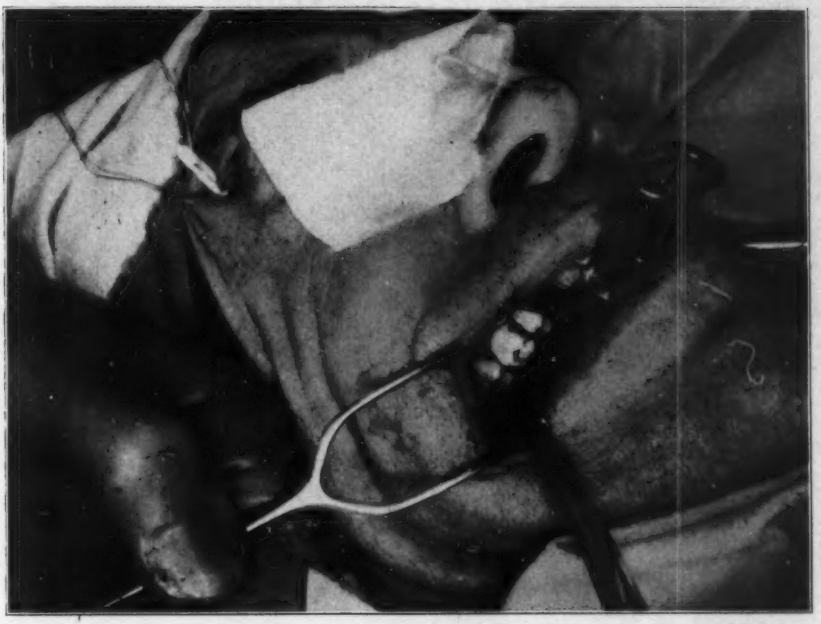

Fig. 6.—The insertion of a wire for fixation of a transverse facial fracture by means of a probe which is being pulled into the oral cavity with a hemostat. The wire is inserted through the supra-orbital ridge and attached later to a wire splint fastened to the maxillary teeth

Fixation by Internal Wiring

Adams[1] described a new method of fixation for horizontal fractures of the maxilla and transverse fractures of the middle face. I have made use of the idea, developing a method of intermaxillary fixation which can be used for patients with inadequate upper teeth but sound lower anterior teeth, suitable for the application of an arch wire splint.[2] .

These methods eliminate the cumbersome Kingsley splint and the easily dislodged headgear which so often has been the cause of pressure sores, not to speak of the inconvenience of these appliances.

Indications for Internal Wire Fixation.—Internal wiring fixation is suitable for the following types of fractures:

1. Horizontal fractures of the maxilla. These may be immobilized by drawing a 26 gage, stainless steel wire through a small hole made below the infra-orbital margin on each side. A short incision is made in the skin, the infra-orbital margin is exposed and its periosteum incised. The hole is drilled with a small burr while retracting the periosteum of the orbit and protecting the eyeball. After being looped through the hole, the wire is fastened to the eyelet of a probe,

1. Adams, W. M., Internal Wiring Fixation of Facial Fractures. *Am. J. Orthodontics* **29**:111 (February) 1943.
2. Thoma, K. H., A New Method of Intermaxillary Fixation for Jaw Fractures in Patients Wearing Artificial Dentures. *Am. J. Orthodont.* **29**:433 (August) 1943.

which is passed underneath the skin along the external surface of the maxilla. When the point of the probe can be felt in the buccal sulcus, a stab incision in the mucosa allows the wire to be drawn into the oral vestibule. If the fracture can be reduced by manipulation, the wires inserted on each side are fastened to a previously attached arch wire which completely immobilizes the fracture (Fig. 5).

2. Transverse fracture of the middle face with the orbit involved may be immobilized similarly by passing the wire through a hole in the supra-orbital ridge just above the frontozygomatic suture. The wire, however, is passed behind the temporal surface of the malar bone, again by means of a probe properly bent so that it will appear in the buccal sulcus in the first molar region (Fig. 6).

In case of late reduction, when the fracture has healed partially in abnormal position, elastic traction may be used. Jelenko splints are attached to both jaws, leaving the fixation wire loose to be attached to the arch band as soon as normal occlusion has been obtained. The wire on each side holds the fractured part securely in contact with the superstructure.

3. In mandibular fractures of the ascending ramus or the neck of the condyle, when interdental wiring cannot be used because of an inadequate number of sound teeth in the upper jaw or because the patient wears an upper denture, the fracture may be immobilized by wires looped through the margin of the piriform nasal aperture. This is punctured with a drill through a small incision

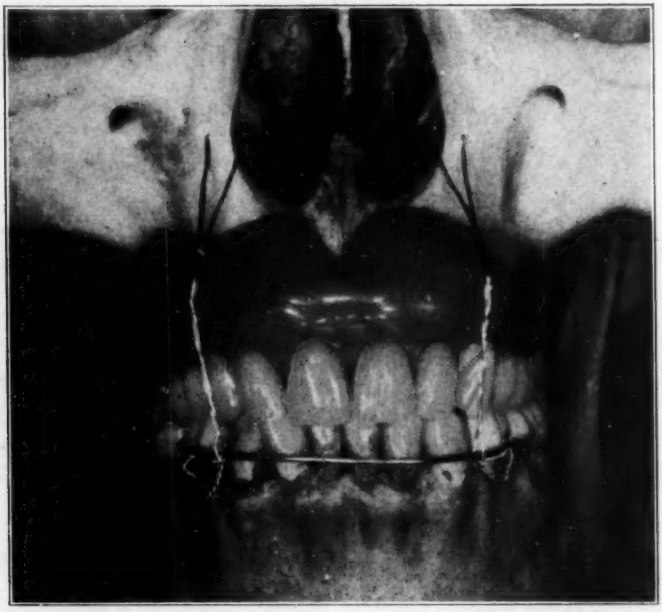

Fig. 7.—Immobilization of the mandible by means of wires inserted through the margin of the piriform nasal aperture to lock the upper denture in place with the mandible in occlusion to allow fractures in the ramus or neck of the condyle to heal

in the labial sulcus on each side. The two wires are brought down to be attached to an arch wire fastened to the lower teeth. If the patient is wearing an upper denture, the wires will rest on its labial flange (Fig. 7); if not it may be necessary to cover the gingiva and teeth in the labial region with translucent acrylic to prevent injury. By means of this method, the mandible can be completely immobilized without the use of external appliances or bandages.

Transfixation with Steinmann Pin

The use of Steinmann pins for fixation of mandibular fractures is hazardous because injury of the mandibular nerve and vessels is not easily avoided, and because if infection is present in the fracture, it is easily carried into the distal fragment with the pins.

Indication for Transfixation with Steinmann Pin.—This method is useful for craniomandibular fixation. The pin is inserted transversely through the mental protuberance of the mandible by use of a Pincock[3] guide and is fastened by means of Frac-Sure connecting rods and links to two wires extended from a previously attached plaster head cap.

Skeletal Fixation with Pins and Clamps

The merits of skeletal fixation have been the subject of heated discussion. The method has been very successful in my hands. However, the cases must be selected properly and the pins inserted with minute attention to details, particularly to aseptic technic. Of the various appliances available for pin fixation, I have found that the one developed by Anderson and modified by Converse and Waknitz, known as the Frac-Sure appliance, is the most adaptable to my

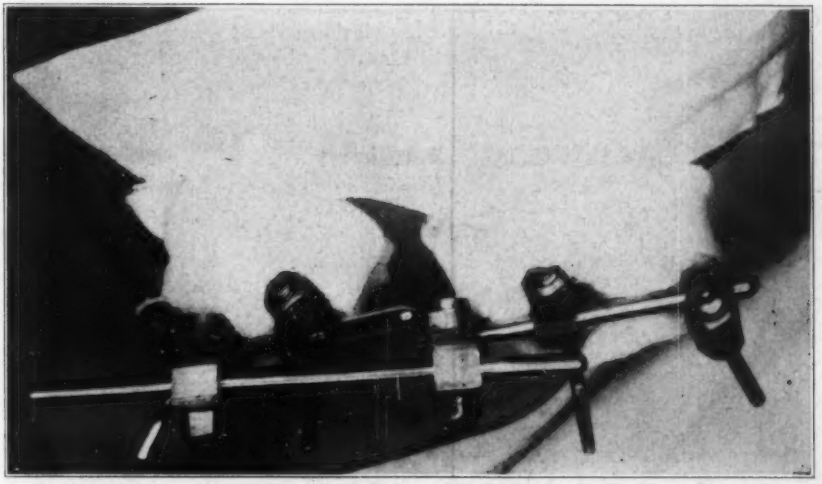

Fig. 8.—Frac-Sure appliance used for immobilization of fracture of the horizontal ramus of the mandible

3. Pincock, D. F., Horizontal Pin Fixation for Fractures of Mandible Using Pin Guide. *Surg., Gynec. & Obst.* 77:493, 1943. Republished *Am. J. Orthodont.* 30:67 (February) 1944.

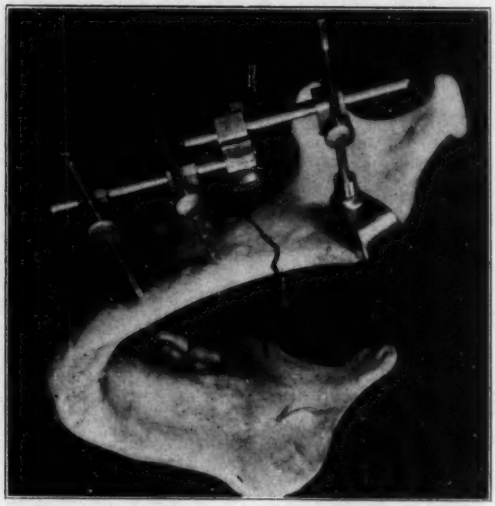

Fig. 9.—Fractured mandibule showing the use of pin fixation in the anterior fragment and a peripheral bone clamp attached at the angle of the jaw

requirements (Fig. 8). In addition, I have developed a peripheral bone clamp which is applied under the skin around the bone through an incision below the inferior border of the jaw. The advantage of the Thoma bone clamp is that it can be used at the angle of the jaw where pins do not hold well (Figs. 9 and 10). It is also preferable to use pins if fixation is required for an unusually long time. Clamp fixation may be used in conjunction with penicillin therapy in the presence

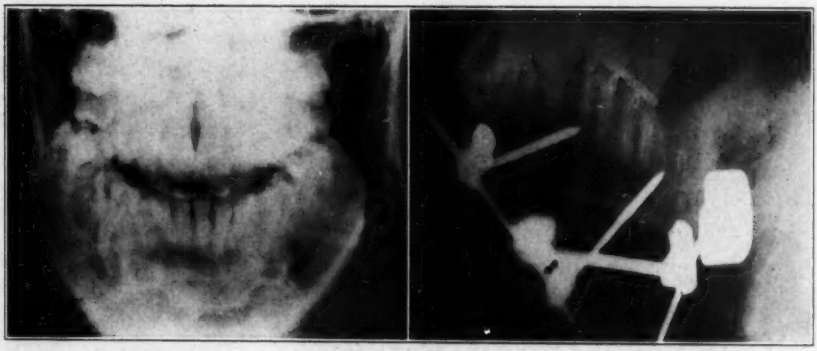

Fig. 10.—Left: Roentgenogram showing badly displaced fracture at the angle of the jaw with secondary fracture on the other side in the bicuspid region. Right: Postoperative view showing immobilization of the fracture by means of skeletal and clamp fixation. Jelenko splints have been applied for immobilization of fracture on the other side

of infection, since with it infection is not carried into the bone as the cortex is not perforated.

Like any method of treatment, the success of skeletal fixation depends entirely on the judgment and skill of the surgeon who employs it. I feel that skeletal fixation has a distinct place in fracture treatment. In analyzing my last 100 cases of fracture of the mandible, it was found that this method had been employed in 25 per cent of the cases. It is an advantage to immobilize the mandible for part of the healing time in many cases, especially fractures which are unstable and cannot be impacted properly. Even slight movement may interfere with the process of repair. Later, however, function influences healing advantageously, especially the deposit of calcium salts. Intermaxillary elastics applied on Jelenko splints probably give the most satisfactory service, especially since they can be removed easily in attending to wounds and infections. Their number may be reduced gradually to allow, first, limited function and, later, to give the patient complete freedom to eat soft food.

Indications for the Use of Skeletal Fixation.—Fixation with pins and clamps is recommended for the following types of fractures:

1. Single or multiple fractures of the edentulous mandible, or if insufficient number of sound teeth are present for intermaxillary fixation (Fig. 9).

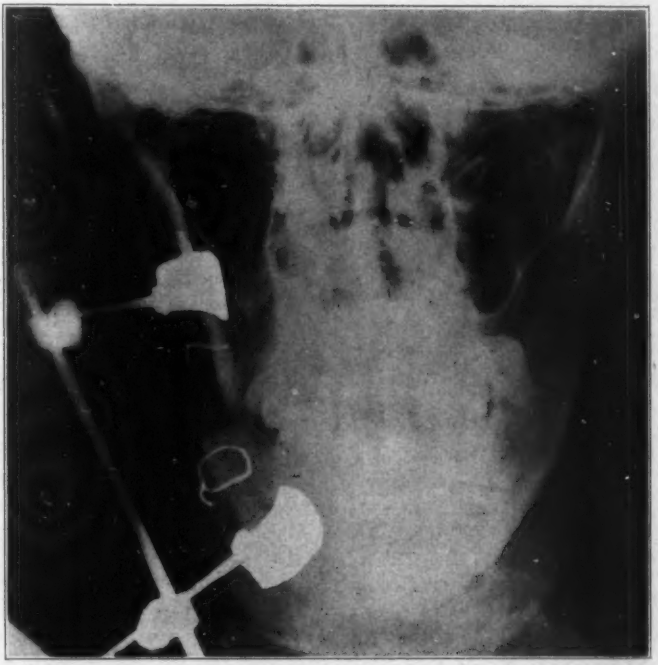

Fig. 11.—Postoperative roentgenogram showing fracture at the angle of the jaw, with loss of bone treated by means of a rib graft with clamp fixation.

2. Badly displaced fractures not easily controlled by intermaxillary fixation, especially if one fragment is edentulous.

3. Fractures at the angle of the jaw, particularly when the posterior fragment is displaced or is difficult to maintain in reduced position. The method is recommended instead of transosseous wiring if there is no way to use intermaxillary fixation or when the fracture is oblique and cannot be impacted. In these fractures it is recommended to use two pins in the anterior fragment and a bone clamp at the angle of the jaw.

4. Fractures in the edentulous jaw complicated by osteomyelitis, or cases of osteomyelitis with pathologic fracture. The pins are placed anteriorly, a distance away from the infected bone, and posteriorly a bone clamp may be used (Fig. 10).

5. In fractures with loss of bone to be repaired by a bone graft, a clamp may be used on each side. These clamps, with a connecting bar, will immobilize the fragments in cases in which intermaxillary fixation cannot be used because of the absence of teeth in one or both fragments. Pins may be used in the anterior fragment, but the clamps make it possible to immobilize longer than would be possible with pins (Fig. 11).

With regard to this method, it should be added that its success depends entirely on the judgment and skill of the surgeon who employs it. It should not be used except in cases in which conservative treatment seems to be inadequate. In addition, this method should be applied only by one who understands the principle of its use and carefully has studied the technic of insertion of the pins and clamps and the subsequent reduction, and fixation of the fracture by means of the remainder of the appliance.

Summary

The methods described can be recommended as useful procedures in the treatment of complicated fractures of the jaw. They should be looked on as an aid in solving some of the difficult problems that may arise. They should be used only if simple and more conservative methods are likely to be inadequate. The procedures described are safe if the operation is carried out under strict asepsis. It is important to avoid carefully any contamination of instruments or gloves from the mouth before and during the operation. The patient should be given the benefit of prophylactic administration of antibiotics (penicillin or streptomycin) because most jaw fractures are compounded into the mouth and therefore are subject to infection. Proper attention should be given to supplementary immobilization of the mandible. With the exception of the Frac-Sure appliance, the methods of fixation described only prevent displacement of the fragments and are not effective sufficiently to prevent motion in the fracture when the jaw is used.—*1180 Beacon Street, Brookline.*

UMI

THE PTERYGOPALATINE INJECTION FOR BLOCKING OF THE MAXILLARY NERVE

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Morristown, N.J.

IT HAS BEEN more than twenty-four years since Silverman,[1] for the first time in the United States, described the possibility of gaining access to the maxillary division of the fifth cranial nerve through the greater palatine foramen.[2] In that interval, the technic has gained some popularity but still is not widely used.

In view of the popularity of the injection for blocking the inferior alveolar nerve, it is difficult to understand why this approach to the maxillary nerve has not enjoyed more widespread use. Unfortunately, the literature on the subject is limited. While all standard dental textbooks describe the posterior infra-orbital injection as introduced by Smith[3] or Labat,[4] the author was able to find only five textbooks[5–9] which describe the possibility of blocking the maxilla through the pterygopalatine canal. Moreover, in a review of the periodicals, the author was able to locate only seven articles on the subject,[10–16] not including Silverman's original paper.

Advantages

1. Blocking of the maxillary nerve using the approach through the pterygopalatine canal avoids multiple injections. Two injections, one of the right and one of the left, are sufficient to obtain profound anesthesia of the maxillae. In contrast, complete anesthesia of all surfaces of the mandible requires a minimum of four injections.

2. The route the needle traverses is the shortest of any of the various technics described to block the maxillary nerve.

3. There is a certainty of landmarks that no other technic affords. The needle, as it advances up the pterygopalatine canal, is surrounded by bone, and consequently it ultimately must reach the pterygopalatine fossa. As in all local anesthesia, accuracy of the injection will hasten anesthesia.

4. The technic, unlike that of Smith or Labat, avoids the possibility of a

1. Silverman, S. L., Advances in Block Anesthesia Including an Original Technique of Injecting the Superior Maxillary Nerve. *D. Cosmos* **65**:974 (April) 1923.
2. Silverman later acknowledged the Dr. Juan Ubaldo Carrea of Buenos Aires had anticipated him in most of the method described. *See* Carrea, J. U., Anestesia Troncular Del Nervio Maxillar Superior Por El Conducto Palatino Posterior. Nuevo Procedimento. *El Odontologo* (Buenos Aires), Nos. 16-17, 1921.
3. Smith, A. E., *Block Anesthesia and Allied Subjects*. St. Louis: C. V. Mosby Co., 1920, p. 380.
4. Labat, Gaston, *Regional Anesthesia: Its Technic and Clinical Application*. Philadelphia: W. B. Saunders Company, 1924, p. 78.
5. Shapiro, H. H., *Applied Anatomy of the Head and Neck*. Philadelphia: J. B. Lippincott Company, 1947, p. 210.
6. Seldin, H. M., *Practical Anesthesia for Dental and Oral Surgery*. Ed. 2. Philadelphia: Lea & Febiger, 1942, p. 190.
7. National Research Council, *Manual of Standard Practice of Plastic and Maxillo-facial Surgery*. Philadelphia: W. B. Saunders Company, 1941, p. 381.
8. Lundy, J. S., *Clinical Anesthesia*. Philadelphia: W. B. Saunders Company, 1942, p. 186.
9. Nevin, M., and Puterbaugh, P. G., *Conduction, Infiltration and General Anesthesia in Dentistry*. Brooklyn: Dental Items of Interest Publishing Company, 1927, p. 106.
10. Peckham, R. N., Block Anesthesia for the Maxilla. *Am. J. Orthodont.* **24**:683 (July) 1938.
11. Rankow, R. M., Pterygopalatine Injection for Block Anesthesia of Maxilla. *Mil. Surgeon* **93**:164 (August) 1943.
12. Dickson, G. C., and Coates, R. H., Regional Anesthesia of the Maxillary Nerve by the Palatal Method. *Brit. D. J.* **79**:242 (November 2) 1945.
13. Gillam, C. G., Better Anesthesia (Palatal Second Division Block). *D. Survey* **13**:871 (July) 1937.
14. Stovin, J. S., The Sphenopalatine Ganglion. *D. Digest* **37**:84 (February) 1931.
15. West, R. F., The Posterior Palatine Second Division Injection. *J. Oregon D. A.* **6**:1 (October) 1937.
16. Jorgensen, H. B., Measurements for Intra-Oral Block of the Maxillary Nerve. *J. Oral Surg.* **6**:1 (January) 1948.

hematoma as the result of puncture of the pterygoid plexus of veins as well as the possibility of injection into the buccal pad of fat.

5. Often this approach to the maxillary nerve permits indicated surgical procedures in the face of swelling and infection of the soft tissue, when general anesthesia is not available or is contraindicated.

Disadvantages

One actual disadvantage to the technic is the possibility of bony obstruction preventing the easy passage of the needle. This may be caused by a tortuous canal or may be the result of failure of the greater palatine canal to open as a single foramen because of the branching of the anterior palatine nerve before it emerges on the palate. This, of course, is an anomaly, and as a rule no difficulty is encountered in the passage of the needle through the pterygopalatine canal to the pterygopalatine fossa.

While not necessarily disadvantages, there are several points which may be considered controversial by some individuals. One is the possibility of breaking the needle as the result of sudden and unexpected movement of the patient's head. The usual place of fracture of a needle is at the hub, and breakage at this point in the technic described would cause little or no difficulty. In the buccal approach to the maxillary nerve, however, there would be far greater danger of loss of a broken needle in the soft tissue. Another controversial point is the possibility of injury to the nerve and vessels in the pterygopalatine canal. As Silverman pointed out in his paper, for years the practitioner has been inserting needles in the infra-orbital canal without undue complications. Certainly, with sufficient precaution, no irreparable injury to the nerve and vessels of the pterygopalatine canal can be anticipated. In a few cases, the anesthetic solution may reach the cranium (not so the needle), and a transient double vision may be experienced by the patient, but this should not be alarming to the operator.

Contraindications

1. Local anesthesia is contraindicated in nervous adults and in very young children; this technic is no exception to that rule.

2. Trismus would prevent the operator from successfully using this approach to the maxillary nerve.

3. This method would be contraindicated if pus or inflammation were present in the palatal apical region of the upper second or third molar.

Technic

In all approaches to the maxillary nerve, the point to which the needle is directed is the pterygopalatine (sphenomaxillary) fossa. This approach does not differ in that respect. As in all deep tissue injections, a thorough knowledge of the anatomy of the region is essential.

The patient is seated in the dental chair in the semireclining position customary in dental operations. The operator faces the patient, standing in front and to the right. With the index finger of the left hand, the greater palatine foramen is palpated. This can be done best by starting back at the junction of the hard and soft palate and working forward. The foramen will, as a rule, be found 3 to 6 mm. anterior to the junction of the hard and soft palate and approximately 15 mm. lateral to the median line. When the foramen is located

UMI

the area is swabbed dry and marked by application of a suitable antiseptic solution.

A 2 cc. Luer-Lok syringe with a 25 gage needle 1½ inches in length is to be preferred in this technic. (The author successfully has used the carpule-type syringe on numerous occasions, but would recommend that the Novocol Anestube (Novocol Chemical Mfg. Co., Inc., Brooklyn, N. Y.), or any other carpule syringe which permits aspiration, be employed if this type of syringe is preferred.) If the operator is unaccustomed to using a carpule-type syringe, the anesthetic solution may be drawn out of the regular carpule into the Luer-Lok syringe, thus insuring sterile technic.

The needle is inserted into the previously prepared area to a depth of 1 cm. or less, and two or three drops of solution is deposited. This will insure anesthesia of the soft tissue in the region should the operator experience difficulty in locating the greater palatine foramen. The syringe is held at approximately a 60 degree angle from the occlusal plane of the maxillary teeth, the barrel occupying a position over the lower cuspid on the same side of the mouth (making the long axis of the syringe and that of the body parallel). If the needle has entered the greater palatine foramen and is in the pterygopalatine canal, no marked resistance will be met.

Penetration of Needle

The depth of penetration of the needle is determined best by the method recently suggested by Jorgensen.[16] (Prior to the publication of Jorgensen's work, the author arbitrarily inserted the needle to a depth of 1¼ inches.) Jorgensen found a close relation between the extra-oral measurement of the distance from the infra-orbital margin to the gingival margin of the bicuspids and the distance from the inferior orbital fissure to the dento-enamel junction of the second molar. Since there was some deviation, Jorgensen stated that by subtracting 3 mm. from the facial measurement, it is possible to approximate the needle distance necessary for optimum anesthesia in 96 per cent of the cases. A piece of sterile rubber dam is used to indicate the previously determined depth of insertion of the needle, the operator bearing in mind that the needle is inserted only to that point where the rubber dam marker is on the same horizontal plane as the cemento-enamel junction of the second molar. Before depositing the anesthetic solution, routine aspiration is carried out in order to determine whether or not vessels are involved.

There need be no fear of entering the cranial cavity when using this technic; as a rule, the needle will strike bone (either the medial pterygoid plate or the inferior surface of the greater wing of the sphenoid) preventing its further passage.

The nerve has been blocked when the patient manifests the sensation of numbness on the lateral nasal region, the infra-orbital region and the lip. Two to four cc. of anesthetic solution will produce profound anesthesia, lasting from one and a half to two hours. Since the ophthalmic branches of the fifth cranial nerve pass from the cranium through the superior orbital fissure, it is entirely possible that anesthesia of the region supplied by this nerve will be the result. As a rule, however, the anesthetic solution does not reach so high.

Conclusions

1. The dangers of blocking the maxillary nerve through the pterygopalatine canal are far less than those of any other approach.

UMI

2. The technic is only moderately difficult but effective when extensive anesthesia is required.

3. When general anesthesia is contraindicated or not available, this technic affords the only means of obtaining anesthesia in the presence of swelling or infection of soft tissue.—*10 Park Place.*

Cavernous Sinus Thrombophlebitis—A Report on 6 Consecutive Recoveries. J. L. Reid and F. McGuckin, in *J. Laryng & Otol.* 61:273, 1946.

The authors present the cases of 6 patients who recovered from cavernous sinus thrombophlebitis, merely to illustrate the improvement in prognosis with the use of penicillin and sulfonamides.

In conclusion they state that, without suggesting that cavernous sinus thrombophlebitis has ceased to be a grave lesion, it is clear that the prognosis has radically altered. Intensive modern therapy, preferably combining sulfonamides and penicillin, is justified even when the case by previous standards appears hopeless.—G. Albin Liva, in International Abstracts of Surgery, *Surg., Gynec. & Obst.* **85**:9 (July) 1947.

Pentothal-Curare Mixture. J. W. Baird, in *Anesthesiology* **85**:75, 1947.

The author describes the preparation of Penthothal-curare mixtures for use in anesthesia. After numerous experiments with varying percentages of curare and combinations of buffers with the Penthothal-curare mixture, the present formula was found most suitable: 2.5 per cent aqueous thiopental sodium (Pentothal sodium, Abbott), 18.5 cc., and d-tubocurarine, 1.5 cc. (150 units). This mixture shows no precipitation for fourteen days, although the solution darkens with age. A freshly prepared solution of Pentothal sodium is necessary to prevent the formation of a precipitate when higher concentrations of curare are used. Solutions over twelve hours old should be discarded. It is advisable to add the curare to the Pentothal solution while it is being agitated to avoid a precipitation at the point of contact of the two liquids.

In the opinion of the author, 5 to 7½ units of curare per cubic centimeter of solution is the correct concentration of curare. Pentothal-curare anesthetics (alcoholic and aqueous) have been administered in more than 50 cases with varying degrees of success. The series includes the use of this mixture for patients on whom cholecystectomy, gastrectomy, colectomy, radical mastectomy and plastic operations have been performed, and for passing an endotracheal tube preliminary to the administration of cyclopropane. One-half to 1 cc. of the mixture was intermittently injected intravenously, as required, to maintain adequate muscular relaxation and depth of anesthesia.

It was noted that less Pentothal was required in the cases in which the mixture was used than in some cases in which no curare was added to the Pentothal solution. The curare solution obliterates many of the troublesome reflex movements which are seen during Pentothal anesthesia. The period of recovery is usually shortened following termination of the anesthetic. Prostigmine (Hoffmann-La Roche) was administered to patients to counteract an overdose of curare. Induction of anesthesia and recovery of the patient were without untoward incident. Muscular relaxation was encountered even though the patient coughed when the glottis was stimulated by the endotracheal tube. The average amount of solution injected preliminary to passing the tube was 10 to 15 cc. of the mixture.—Mary Karp, in International Abstracts of Surgery, *Surg., Gynec. & Obst.* **85**:88 (July) 1947.

UMI

OPERATION FOR THE REPAIR OF ORAL-ANTRAL FISTULAE

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San Francisco

OPENINGS from the oral cavity to the maxillary sinus may result from a number of causes. Bone destruction caused by syphilis, osteomyelitis, the removal of extensive growths, gunshot wounds and the extraction of teeth, all may result in the formation of more or less permanent openings between the mouth and the maxillary sinus.

The majority of these openings and the ones which are of primary interest in this paper are caused by the extraction of teeth or the removal of fractured roots. The reason for this becomes apparent when the relationship of the floor of the maxillary sinus to the roots of the upper molars and sometimes the upper bicuspids is considered.

Causes of Openings into Maxillary Sinus

The more definite causes of these accidents during the extraction of teeth may be listed as follows: (1) bone destruction over the apices of the upper molars or bicuspids either from infection, cyst formation or malignant growth; (2) forcing of a root into the sinus and subsequent enlargement of the socket during the process of its removal; (3) dipping down of the floor of the sinus between the buccal and lingual roots of the upper molars; (4) extension of the sinus well back into the tuberosity with a thinning of the walls around the third molar, which may result in fracture of the tuberosity with resultant exposure of the sinus; (5) forcing of an impacted or partially erupted third molar into the maxillary sinus during application of forceps or elevators; (6) marked reduction of the vertical height of the tooth socket by developmental or anatomic deficiency or more often by destruction of the buccal plate and accompanying gingival recession due to periodontoclasia; also the relations between the vertical height of the tooth socket and the horizontal diameters of the tooth socket, especially where the roots are widely separated. An opening into the sinus during the extraction of this type of tooth leaves a socket which is quite wide buccolingually and which lacks sufficient buccal and lingual soft tissue to afford proper closure.

These are some of the more usual ways in which these openings are made. The fact that an opening through the socket of a tooth into the maxillary sinus has been made does not mean necessarily that the opening will persist and that a permanent fistula will result. If treated properly these openings will, in a large percentage of cases, close uneventfully unless: (1) such a large opening has been made that the soft tissue is not sufficient to cover it, (2) infected material has been forced through the opening into the sinus, thus causing a secondary infection of the sinus; (3) the opening has been maintained through the placing of packs in the socket, mechanically preventing closure; (4) sneezing, coughing or blowing of the nose dislodges the clot and allows the ingress of food debris with subsequent

infection; (5) irrigation of the sinus through the socket has taken place postoperatively, or (6) the maxillary sinus has been infected before the extraction.

The operator, having opened into the maxillary sinus during the extraction of a tooth, in almost all cases may avoid the embarrassing complication of a permanent fistula by observing and avoiding the most common causes.

A case was described by Sloane[1] in which, during the extraction of a first molar tooth, the bone forming the floor of the sinus and including the second molar and tuberosity was fractured and required removal. The flaps were sutured, the usual precautions were taken and healing was uneventful. There was no infection of the antrum.

Precautions Against Recurrence of Opening

It is necessary, therefore, to do everything within one's power to prevent these permanent openings from occurring. The following suggestions may be helpful. When an opening into the antrum occurs the wound should not be irrigated. Do not sponge in such a way as to force material into the sinus. Use suction wherever possible. Allow a blood clot to form. The soft tissue should be sutured buccolingually, drawing the flaps partially across the opening of the socket. Place a gauze sponge with an ample amount of vaseline over the socket and instruct the patient to close gently on this for five or ten minutes. This allows time for a good clot formation. Ask the patient to refrain from smoking or using a mouth wash for several days. Caution the patient about blowing the nose. In most cases normal healing will occur and there will be no opening.

The above applies only to cases where the maxillary sinus is in a healthy condition. If the sinus is the seat of a chronic infection the chances of permanent

1. Sloane, Robert B., Fracture of the Maxilla During Simple Tooth Extraction. *J.A.D.A.* **32**:915 (July 1) 1945.

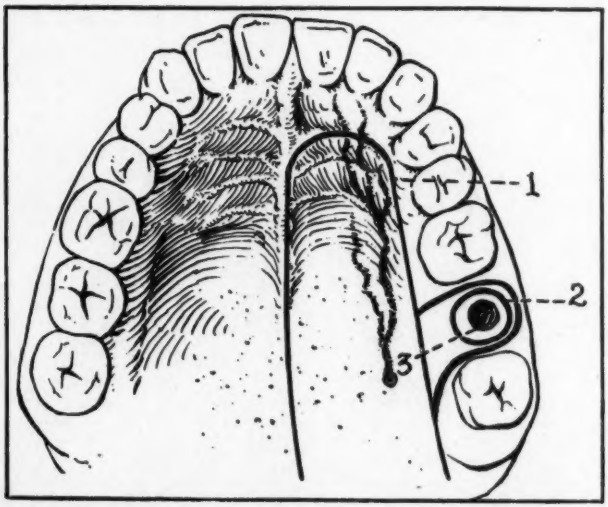


Fig. 1.—Position of the lateral incision, showing (1) palatal flap outlines (2) doughnut shaped flap and (3) sinus opening into antrum

closure are very slight. If the operator finds, on opening into the sinus, that there is a drainage of pus, or if polypoid tissue can be seen extending down into the opening, immediate consultation with a rhinologist should be ordered. This applies not only to the immediate closure of the openings but also to the chances for success in surgical intervention attempted later. This point is stressed because it is overlooked so often by dentists and even by rhinologists.

Textbooks on oral surgery are not as definite on this point as they might be. Cogswell[2] says, "Care must be taken to eliminate any acute infection for a period of several days before the operation." This can be extended to include chronic infections also. The maxillary sinus should be healthy before any operation should be attempted to close a fistula leading from the mouth.

For this reason many times it is advisable for the oral surgeon to cooperate with the rhinologist in the treatment of these cases. In fact if the sinus is involved and if a radical antrum operation with subsequent nasal treatment is contemplated, often it is advisable to have the operation completed by the rhinologist.

Dunning,[3] Berger,[4] Christiansen[5] and Morgenstern,[6] in articles concerning

2. Cogswell, W. W., *Dental Oral Surgery*. Colorado Springs: Outwest Printing and Stationery Company, 1932.
3. Dunning, H. S., Surgical Treatment of Chronic Maxillary Sinusitis of Oral Origin. *J.A.D.A.* **18**:1307 (July) 1931.
4. Berger, Adolph, Oroantral Openings and Their Surgical Correction. *Arch. Otolaryng.* **30**:400 (September) 1939.
5. Christiansen, G. W., Treatment of Diseases of the Maxillary Antra of Dental Origin. *J.A.D.A.* **30**:226 (February) 1943.
6. Morgenstern, B. P., A Consideration of Accidental Openings into the Maxillary Sinus. *D. Outlook.* **29**:313 (July) 1942.

Table 1.—Analysis of twelve cases

Case Number	Location of Fistulae	Approximate Diameter of Sinus Opening (millimeters)	Remarks
1	Upper left first molar	3	Uneventful recovery
2	Upper left first molar	5	Uneventful recovery
3	Upper right first molar	5	Uneventful recovery
4	Upper left first molar	6	Uneventful recovery
5	Upper left second molar	4	Uneventful recovery
6	Upper right second bicuspid	7	Suppuration fourth postoperative day
7	Upper right first molar	5	Uneventful recovery
8	Upper right first molar	4	Uneventful recovery
9	Upper left second molar	2	Uneventful recovery
10	Upper right first molar	6	Suppurating fistula failed to close (defect repaired at subsequent operation)
11	Upper left first molar	5	Uneventful recovery
12	Upper left first molar	5	Uneventful recovery

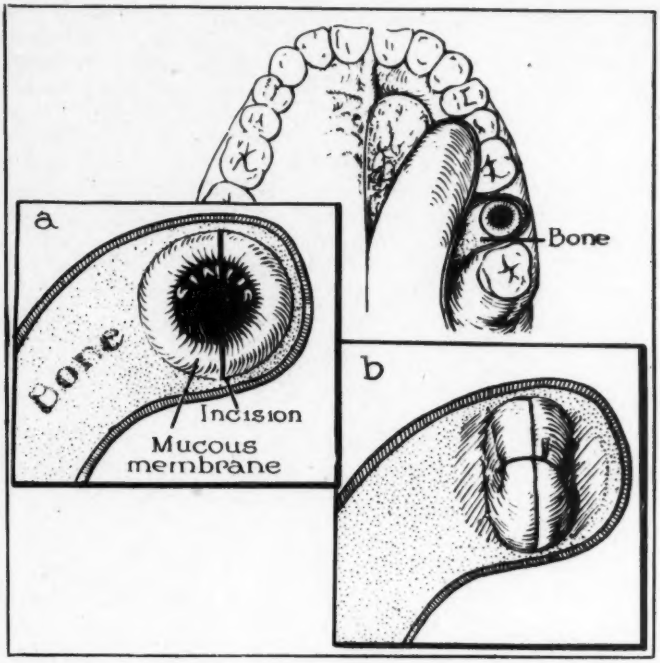


Fig. 2.—The undermined palatal flap has been raised and is being moved into position to close primary defect (two thickness repair). A: Doughnut shaped flap incised and undermined. B: Two semicircular flaps inverted and sutured

the operation of closing these openings, all stress the importance of clearing up infection in the sinus before attempting closure.

Operative Technic

Having considered some of the causes of these openings and some of the reasons for failure, the technic of the operation itself will be discussed.

If the sinus opening is small, less than 0.5 cm. in circumference, Dr. Adolph Berger's[7] method is most practical.

The soft tissue lining the fistula is removed. The soft tissue including the periosteum is loosened for about 1 cm. on the buccal and lingual side of the fistula. A curved incision with its convexity directed away from the opening is made on the lingual side about 1 cm. away from the lingual margin of the sinus opening. The sinus opening is closed by approximating the two edges of tissue and suturing. This constitutes a double pedicle sliding flap. Wherever the sinus opening has a diameter larger than 0.5 cm. it will be advisable to obtain sufficient tissue from adjacent areas to fill in or close the primary defect.

7. Berger, Adolph, *Principles and Technique of Oral Surgery*. Brooklyn: Dental Items of Interest Publishing Co., 1923, p. 191.

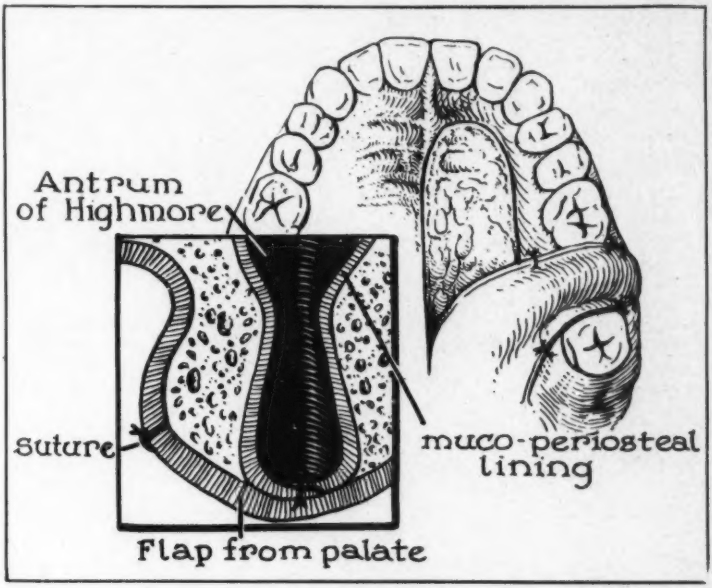


Fig. 3.—Palatal flap sutured in place over primary defect. Inset: Cross section of sinus passage

The tissue may be obtained by means of a mucoperiosteal pedicle flap swung from either the cheek tissue or from the palate.[8] The preferred region is the palate. The reason for this is that the tissue is manipulated more readily and it also will have incorporated in its base an excellent blood supply from the descending palatine artery, both anterior and posterior branches.

The essential advantage in the Axhausen[9] method of repair is that there is an epithelial covering on the antral side as well as on the palatal side of the defect, resulting in two thicknesses of tissue instead of one thickness.

The only disadvantage to this method is that the case to be operated on must be one in which the fistula has been present for a considerable length of time; one in which there is a complete epithelial lining covering the walls of the fistula so that sufficient tissue may be raised from the walls of the fistula as illustrated in the sketches (Figs. 1, 2 and 3).

A circular incision is made around the sinus opening through the mucous membrane to the alveolar bone, the circular incision to be made approximately 0.5 cm. from the sinus opening. The next step is to undermine the tissue between the circular incision and the sinus opening. The resulting raised, doughnut shaped flap of tissue may be reversed and tucked into the sinus opening and the proximate edges of tissue sutured in place. This is in contrast to the picture (Fig. 4) of the models illustrating a one thickness repair of a defect which may be performed immediately after the development of a fistula.

8. Padgett, E. C., *Surgical Diseases of the Mouth and Jaws.* Philadelphia and London: W. B. Saunders Co., 1938, p. 275.
9. Axhausen, G., *Technique and Results of Cleft Palate Surgery.* Leipzig: Thieme, 1936.

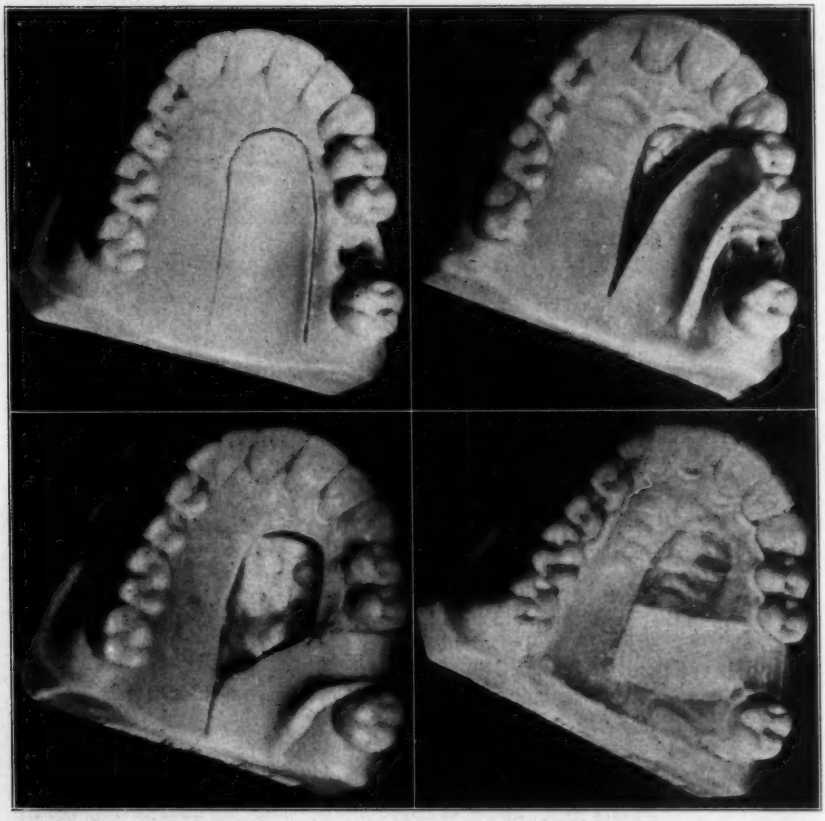
Steps in Procedure

1. Make an impression of upper arch using a hydrocolloid material.

a. In making the acrylic splint provision must be made for the relief of pressure over the vessels in the flap. This is important especially at the point where the flap is turned from the palate over the fistula. Pressure at this point endangers the blood supply of the flap and may result in sloughing.

2. Construct a wafer thin splint covering the entire palatal area. Clear acrylic is the material of choice for splint construction.

3. Sterilize the splint in 3 per cent hydrogen peroxide solution.



Photographs by Louis C. Roberts.

Fig. 4.—Upper left: Outline of palatal flap, one thickness repair. Upper right: Undermined palatal flap raised and moved into position to close primary defect, one thickness repair. Lower left: Palatal flap sutured in place over primary defect, one thickness repair. Lower right: Bipp gauze in position over palatial flap, held in place by acrylic splint (used over either one or two thickness repair)

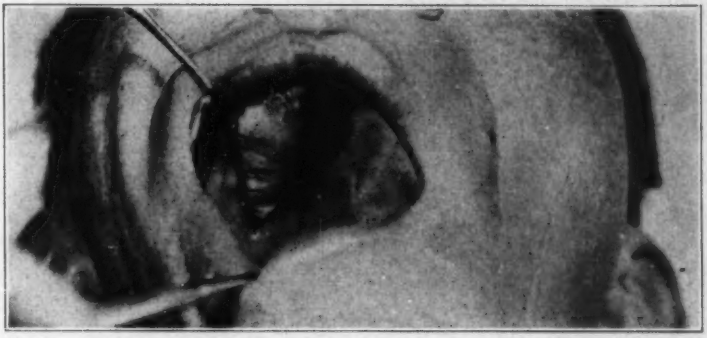


Fig. 5.—View of palatal flap in edentulous patient

4. Administer premedication: Sodium propylmethylcarbinylallylbarbiturate (Seconal, Lilly) 1½ gr., thirty minutes prior to operation.

5. Spray the oral cavity with tincture of Metaphen (Abbott) solution.

6. Administer anesthesia: Procaine hydrochloride 2 per cent solution; epinephrine 1/50,000.

The following injections will result in satisfactory anesthesia:

a. Posterior palatine injection, right or left. Deposit the solution immediately over the posterior palatine foramen, anesthetizing the palatine nerve.

b. Anterior palatine injection. Deposit the solution laterally to the papillae over the incisive foramen, anesthetizing the nasopalatine nerves.

c. Zygomatic injection. Deposit the solution over the posterior superior dental nerve.

d. Supraperiosteal injection. Deposit the solution in the canine fossa over the bicuspid teeth, anesthetizing the mesiobuccal root region of the upper first molar.

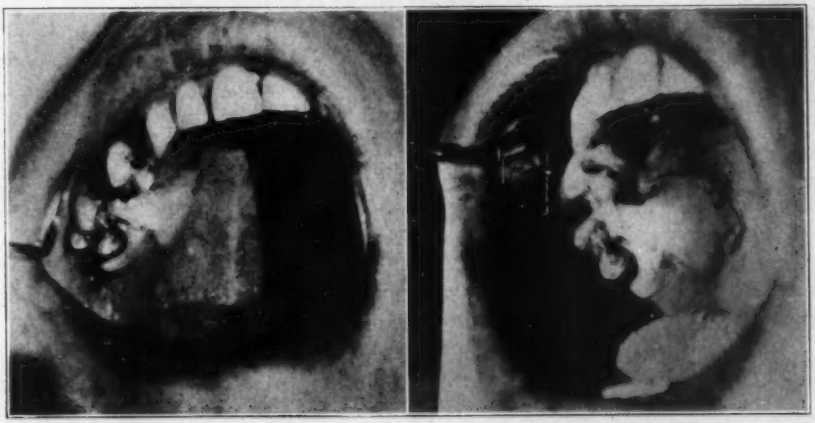


Fig. 6.—Postoperative results of palatal flap operation. Left: Front view. Right: Side view

7. Outline contemplated incisions with dye.

a. Make a pedicle mucoperiosteal flap sufficiently long and wide to allow for contracture after becoming a part of the reconstructed field.

8. Incise outlines and undermine flaps, avoiding manipulation of the tissue any more than is necessary.

a. Use hooks in place of tissue forceps to manipulate flaps.

9. Do not kink palatal flap or blood supply will be impaired, resulting in blanching of the flap and probable sloughing of tissue.

a. If there is a tendency toward a prominence due to buckling at the turn of the flap, this can be removed or incised and adjusted at a later date after the healing is complete and the fistula is closed.

10. Dust raw surfaces with sulfathiazole powder.

11. After undermining and turning the flap it must be placed in direct contact with the outline of the recipient area and the underlying surface.

12. Suture the flap to place in its new bed, using black silk suture material.

13. Place bipp (bismuth iodoform paraffin paste) gauze over the flap and over the exposed bone from which the flap was rotated.

14. Insert acrylic splint, which will prevent gross contamination of the flap. The splint also will prevent the patient's tongue from coming in contact with the flap.

15. The splint may be removed on the third postoperative day for the purpose of cleaning the oral cavity. One part of a 3 per cent hydrogen peroxide solution diluted with two parts of warm water is used. Change bipp gauze and wash splint with soap and water followed by 70 per cent alcohol prior to replacing the splint.

a. The splint may be removed daily thereafter for the purpose of cleansing the oral cavity and splint.

16. Sutures may be removed on the seventh or eighth postoperative day.

17. The splint may be removed permanently from the oral cavity on the tenth postoperative day.

18. Prior to the operation the patient should be instructed in oral hygiene, placed on a soft diet while wearing the splint and also during the followup period.

If for some reason it is not practical to obtain sufficient tissue from the palatal area, a pedicle flap may be raised from the cheek. The flap may be sutured in place in the recipient area.

The wound left in the donor region of the cheek may be undermined if necessary so that it may be sutured without tension. After an interval of three or four weeks, the base of the flap is cut and the remainder is fitted into the recipient area and sutured. The stump of the pedicle then may be returned to its original bed.—*490 Post Street.*

SURGICAL EMPHYSEMA AFTER TOOTH REMOVAL

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SURGICAL EMPHYSEMA is a condition wherein air has penetrated the connective tissues of a region and remains there subcutaneously. It follows trauma or a surgical operation and occurs when air is introduced forcibly through a break in the tissues. It is unusual for the condition to occur around the jaws, and few cases have been recorded in the literature.

Literature

The report of Turnbull[1] is the earliest to be recorded. He recounted that in 1870 he had removed a bicuspid tooth from a bugler on a naval vessel. Shortly thereafter, the bugler blew a mess-call, resulting in an immediate and enormous swelling of the side of the face from which the tooth had been removed. Schaefer and Williams[2] cited this phenomenon in a man, aged 30, after the attempted removal, by a dentist, of the left mandibular second molar. The operation lasted three and a half hours, and a compressed air blower was used at intervals to dry the field of operation. The regions involved in this patient were those of the mandible, neck and chest on both sides. Binns[3] described this condition in a male patient following the removal of the right maxillary second bicuspid and first and second molars, the emphysema arising after blowing on a clogged pipe stem.

Berry[4] discussed this complication in a 38 year old man following the removal of the left maxillary second molar, with perforation of the antrum and laceration of the attachment of the buccinator muscle. In this patient the cheek, lower eyelid, and posterior triangle of the neck were involved. Shafto[5] reported this involvement in a man following the removal of the left maxillary third molar and the left mandibular first molar. The emphysematous area involved the face, both sides of the neck and the entire chest to the level of the sixth rib and was induced by harsh and repeated nose blowing following the extraction. Mead[6] mentions a few cases but gives no essential details of his observations.

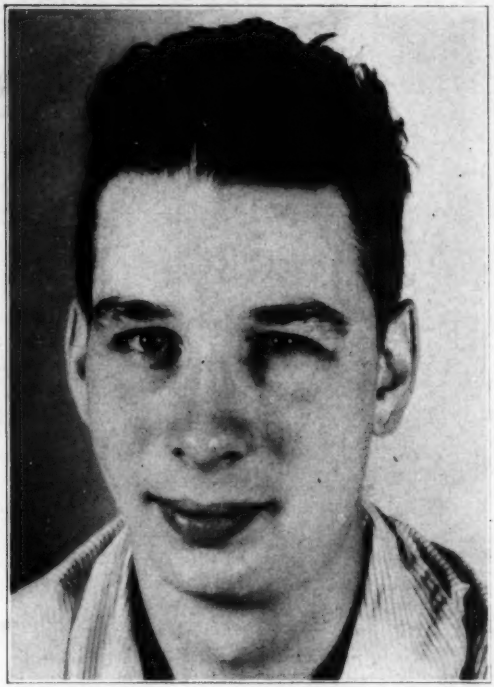
Report of Case

History.—A senior medical student, aged 24, entered the University of Kansas Hospital on October 17, 1943, with a chief complaint of swelling of the left side of the face following tooth removal.

On the previous afternoon the patient had had a left mandibular impacted third molar

From the Department of Surgery, University of Kansas School of Medicine, Kansas City.

1. Turnbull, Alexander, A Remarkable Coincidence in Dental Surgery. *Brit. Med. J.* 1:1131 (May 5) 1900.
2. Schaefer, Joseph E., and Williams, P. E., Emphysema Following Extraction. *D. Cosmos.* 75:377 (April) 1933.
3. Binns, H. T., Unusual Sequelae of Extraction. *Brit. D. J.* 58:21 (January 1) 1935.
4. Berry, C. V., Surgical Emphysema Subsequent to Extraction of an Upper Molar. *S. African D. J.* 17:183 (June) 1943. Abstract by C. W. Waldron, *Yearbook of Dentistry*, 1943, p. 335.
5. Shafto, C. E., Surgical Emphysema of the Neck and Chest Wall Following Dental Extraction. *Brit. D. J.* 78:364 (June 15) 1945.
6. Mead, S. V., *Oral Surgery.* St. Louis: C. V. Mosby Co., 1946, p. 362.



Photograph of patient taken twenty-five hours after surgery, showing emphysematous areas in temporal fossa, cheek, infra-orbital, submandibular and low neck regions on left side

removed, under block anesthesia. The operation lasted about an hour and terminated at 2:30 p.m. During the course of the operation a suction apparatus was used to remove blood and saliva from the area, but at no time was a spray, either air or water, used in the mouth. At 3:00 p.m., while eating luncheon, he had occasion to blow his nose rather vigorously. Immediately thereafter, swelling was felt in the left cheek, and palpation revealed crepitation over the distribution of the masseter muscle and anteriorly to the commissure of the mouth. The patient returned to his home, slept from 4:00 to 6:00 p.m. and on awakening noticed that the swelling had extended to the left infra-orbital region and the inner and outer canthi of the eye, to the temporal fossa and to the submandibular region, terminating at the lower border of the hyoid bone. The next morning the swelling had increased slightly in all regions mentioned, particularly in the temporal fossa, and also had extended downward in the neck to the sternal section of the clavicle. It was after this observation that he sought admittance to the hospital.

Examination.—Examination of the patient's mouth after admittance revealed normal movement of the mandible with no trismus present. The mucous membrane at the site of operation was not displaced, nor was it unduly traumatized. The swelling in the face and neck was not tight, but soft and pliable. Palpation over the region involved disclosed a crackling sensation subcutaneously, indicative of the presence of air, that was not painful to the patient. The

crepitation was most noticeable in the infra-orbital region, the cheek, the temporal fossa, over the greater cornu of the hyoid bone and the sternal portion of the clavicle (see photograph).

Course.—Forced bed rest was ordered, and as the patient was not suffering any discomfort, no therapy was prescribed. On the following day (October 18) the swelling had subsided slightly, and the crepitation had decreased. Improvement continued, with total disappearance of the swelling and crepitation and dismissal of the patient on October 20, 1943.

Comment

This report concerns a circumstance that undoubtedly occurs more often than the infrequent reports in the literature would indicate. While it is a rare happening, the paucity of publications tends to show that its occurrence, startling as it is, fails to be identified properly.

The etiology of this condition is from air that has been forced under pressure into the tissues following injury. With the exception of the case reported by Berry[4] as of spontaneous origin, all citations in the literature reveal air under pressure as the cause—blowing a bugle, a compressed air blower, blowing on a clogged pipe stem and forceful nose blowing.

The patient discussed in this report blew his nose vigorously one-half hour after the termination of an operation in his mouth. In the act of blowing the nose the lips are closed and forceful expelling of air from the lungs clears the nasal passages of mucous and debris. It is not difficult to see that the same blast of air easily could be forced under mucous membrane that had been retracted, or lacerated muscle attachments at the site of operation, and gain access to muscle and fascia planes and thus be distributed over the face, neck and chest wall. The initial infiltration of air in this patient involved only the cheek, but later extended to the infra-orbital, temporal, submandibular and clavicular regions. This delayed pneumatic extension can be accounted for by the air being forced to adjacent areas by movements of the jaw in speech and mastication, by movements of the neck and by deglutition.

Summary

An unusual occurrence following surgery of the oral cavity has been presented. The dental surgeon should avoid the use of air or water sprays during the course of an operation. Patients should be cautioned, following oral surgery, to avoid vigorous nose blowing, or blowing on musical instruments, pipe stems or other devices that require the forceful expulsion of air.

There is a potential danger of ensuing infection of the region of emphysema which, should it occur, could be controlled ordinarily by penicillin. In rare instances incision and drainage might become necessary.—*University of Kansas Medical Center, Kansas City.*

Treatment of a Case of Noma with Penicillin. A. R. Klossner, in *Ann. Chir., gynec. fenn.* 35:5, 1946.

After the extraction of a tooth, a case of noma occurred in a 17 year old girl. Upon transfer to the surgical department, this undernourished patient was found to have a severe secondary anemia. This condition was accompanied by a necrotic, foul smelling ulcer (about 4 by 5 cm.), involving the left cheek. The lesion was sharply demarcated from the normal buccal tissue by an edematous, parboiled appearing border. Irritation of this lesion elicited no bleeding.

Treatment consisted, first, of the application of neoarsphenamine (Neosalvarsan, Winthrop) and sulfathiazole powder for three days, without healing. After this, penicillin was administered in doses of 10,000 units every four hours until a total of 270,000 units had been given. Within twenty-four hours after the penicillin first was given, healing was apparent and the foul odor had decreased. The patient was discharged from the hospital approximately eighteen days later, with a healed fistula in the cheek through which the teeth were visible. Three months later, the patient was seen again, and at that time there was a healed scar at the site of the previous perforation.

The discussion of this case includes a complete historical review, plus a résumé of the important contributions to the literature on this subject.—Samuel J. Fogelson, in International Abstracts of Surgery, *Surg., Gynec & Obst.* 85:196 (August) 1947.

UMI

VENIPUNCTURE TECHNIC

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THE INCREASING use of the intravenous method of administering drugs places emphasis on the technic of venipuncture. The suggestion offered here, if adhered to, will simplify venipuncture and aid in eliminating the bad mutilation of arms too frequently seen. The beginner, in practicing, should avoid the more difficult veins at first so as to acquire the feeling of entering various types of veins. This sense of feel for entering veins can be acquired only by repeated practice. The mastery of venipuncture technic is rewarded by the patient's appreciation and the saving of the operator's time.

Position of the Arm

Slight flexion of the elbow often eases skin tension and enlarges the size of the veins at the cubital space. Avoid pressure on the medial surface of the upper arm by keeping the arm away from the chest. After venipuncture is completed, flexion of the arm relaxes the tissues in the cubital space and often guards against displacement of the needle if the muscles of the arm contract during anesthesia.

Type and Location of Tourniquet

Rubber tubing of the size used in a hemacytometer or a Penrose drain easily may be tied in a single knot. Either of these is less uncomfortable than heavier tubing and a hemostat. The tension of the tourniquet should be tight enough to stop the venous return but not tight enough to reduce the arterial flow to the part.

Whenever possible, the tourniquet should be placed not more than 3 inches above the venipuncture site.

Preparation and Choice of Veins

The use of alcohol (70 per cent) is recommended in preparation of the skin for venipuncture, as it wets the skin and fingers thoroughly and increases the sense of feeling at least 50 per cent when the vein is palpated. Deep veins are difficult to palpate when the skin and fingers are dry.

Large, deep, palpable veins at the cubital space generally are more satisfactory for puncture than small, visible surface veins. Small surface veins tear easily and often leak around the needle, causing hematomas. Small, thin walled, superficial veins are more difficult to fix and enter with the needle.

Veins recommended for intravenous anesthetic routes (in the order of frequency of use) are: (1) median basilic; (2) median cephalic; (3) median cubical; (4) cephalic veins of the forearm; (5) median vein of the forearm; (6) veins of the dorsum of the hand; (7) cephalic vein at the radial margin of the wrist, or (8) long saphenous vein anterior to the medial malleolus.

Clinical presentation at the twenty-ninth annual meeting of the American Society of Oral Surgeons, Boston, August 2, 1947.

UMI

Needles Used in Venipuncture

Use only sharp, stiff, 20 gage needles when the vein size permits, as it does in 95 per cent of the patients. Small, flexible needles bend and are difficult to advance without transfixing the vein (Fig. 1, A). The small needles require much more care in usage.

The needle bevel should be of medium to short length. When a short bevel is used, the operator feels a resistance characteristic of the resilience of rubber when the needle is passed through the wall of the vein. Long beveled needles may transfix the vein because it is impossible sometimes to ascertain whether the needle has passed through the wall of the vein. Aspiration of blood to confirm the position of the needle in the vein is easier with short bevels.

The needle point should be advanced a half inch or more within the vein. Slight muscular contractions often displace needles when the point is just within the lumen of the vein (Fig. 1, B).

Aids in Technic

Palpate the vein with two fingers to determine its course before starting the venipuncture. Advance the needle parallel to this course and downward until

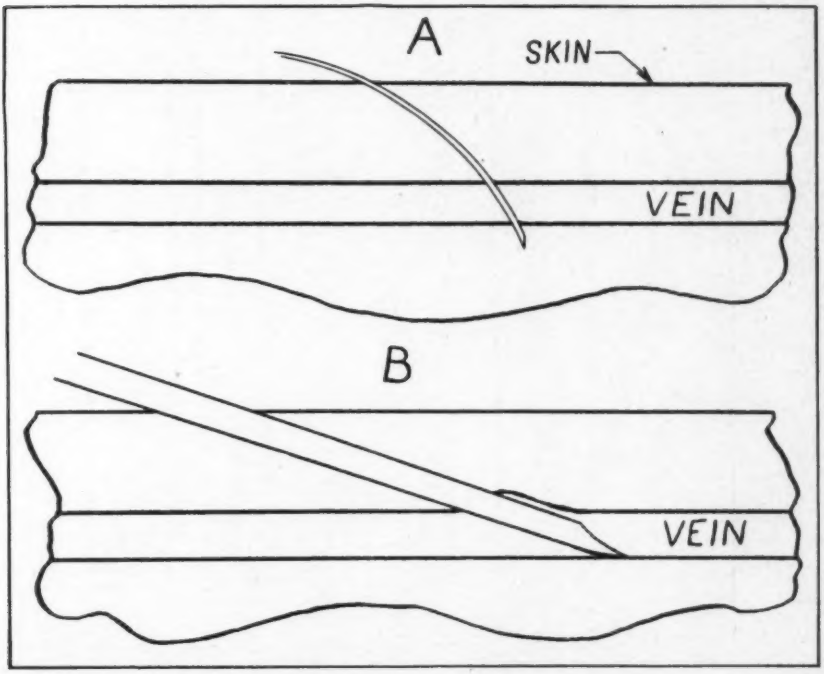

Fig. 1.—A: Small flexible needle bends when attempt is made to raise the point, and it immediately transfixes the vein. B: stiff needle used with the bevel up can be advanced more easily in the vein

the vein is reached. This allows for advancement of the needle in the vein after the vein is reached and minimizes the danger of passing the needle out through the opposite wall of the vein (Fig. 2, B).

A slight aspirating force may be applied after the needle enters the skin. When the vein is entered an immediate show of blood in the tubing or syringe will demonstrate the position of the needle.

After the needle has entered a deep vein, the point may be raised slightly to facilitate advancement of the needle. The needle may be more easily advanced if a stiff one is used with the bevel up. Small, flexible needles bend when attempts are made to raise the point, and they immediately transfix the vein when advanced.

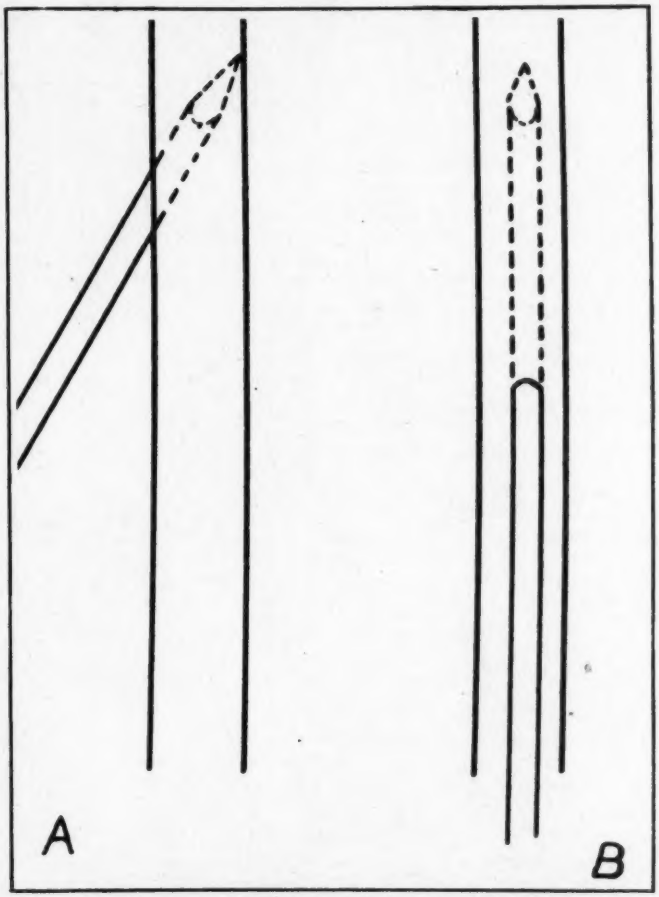

Fig. 2.—A: Incorrect method of entering a vein. The needle cannot be advanced properly and is easily misplaced. B: Correct method of entering a vein. The needle is parallel to the vein and may be advanced when inside the vein

Slapping the skin over the vein sometimes clarifies the location of an otherwise impalpable vein.

The blood pressure sometimes falls when the patient watches the venipuncture, so that it seems advisable to have the patient look away from the procedure.

In extreme cases, the application of hot packs to the arm will dilate the veins, making them palpable. Hot packs are more effective when applied to the arm, forearm and hand rather than at the venipuncture site alone.—*111 Atlantic Avenue.*

Impending Death under Anesthesia. H. Bailey, in *Lancet* 1:5, 1947.

Experience has taught that cardiac arrest can occur in any patient, with any anesthetic agent and any anesthetist. For obvious reasons, a general emergency surgeon is more often confronted with impending death under anesthesia than is the surgeon engaged in special branches.

Two fundamental conditions are segregated: blue asphyxia (primarily respiratory) and white asphyxia (primarily cardiac). The latter is far more serious. After twenty years' observation, the author has now abandoned expending time in the performance of artificial respiration and the injection of epinephrine into the ventricle. He recommends immediate cardiac massage when the heart stops. The current plan of action includes intermittent compression of the ventricles through the diaphragm within one and a half minutes after the stoppage occurs. It appears that the early anxieties and later complications that follow temporary cardiac cessation are proportional to the length of time the organ is functionless.

The time limit for successful cardiac massage is a great deal longer in cases in which the heart has ceased to beat after blue asphyxia, as the cerebral mechanism is not deprived of blood.

In sudden cases of vasomotor collapse, when a pint or more of fluid must be put into circulation in a matter of minutes, injection by syringe (not by gravity) into the bone marrow is a method that has yet to be bettered. This method is advocated by the author for use in desperate crises.—Mary Francis Poe, in International Abstracts of Surgery, *Surg., Gynec & Obst.* 85:90 (July) 1947.

Serum Proteins in Normal People. J. Bing, J. Naeser, G. Rasch and K. Rojel, in *Acta med. Scandinav.* 126:351, 1946.

Although numerous investigations have been made concerning serum proteins and their fractional values in disease states, the authors observed that there was a paucity of material regarding the protein content of normal serum. In reviewing the literature they noted a constant difference according to the method of protein analysis used. Of the two chief determinations, that of Henriques and Klausen is considered more exact when compared to the test of Howe.

The total serum protein, albumin and globulin were measured in 87 clinically normal people (38 males and 49 females) by the method of Henriques and Klausen. A careful statistical analysis of the results was made with attention to the variations according to sex and age. Although small differences were found for these factors, they were so small that for practical purposes they can be ignored. The following values were obtained: total protein 5.6-8.2; albumin 3.5-5.5; globulin 1.6-3.2.—C. Frederick Kittle, in International Abstracts of Surgery, *Surg., Gynec. & Obst.* 85:103 (July) 1947.

AMERICAN SOCIETY OF ORAL SURGEONS

The thirtieth annual meeting of the American Society of Oral Surgeons will be held at the Stevens Hotel in Chicago, September 9 to 11, 1948. The secretary is Harry Bear, 1112 East Clay Street, Richmond 19, Va.

UMI

USES AND ABUSES OF SKELETAL FIXATION

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SKELETAL FIXATION is a recently developed method of fracture management, the first principles of which were conceived about ten years ago.[1] A considerable number of articles dealing with the various methods and appliances have appeared in the literature in recent years.[1-9] Many appliances have been designed and manufactured, but with few exceptions all have their limitations.

Unless an appliance is practical, universal in its application, flexible in its adjustments and positive in its retention, it does not fulfill the necessary requirements. For instance, some appliances require a complete or partial reduction of the fragments before the pins can be inserted. This is not only difficult, but many times is impossible to do and certainly complicates the operation. Other devices do not permit adequate latitude of adjustment once they are applied.

Requirements of an Appliance

Practical experience with these limitations is a trying teacher, but out of this experience certain requirements have been made clear. They can be enumerated as follows:

1. Each fixation pin may be inserted individually into the bone fragment at the most efficient position without being limited in its position by the limitations of adjustability of the connecting attachment.[2]
2. The pins first may be inserted and then attached to the stabilizing unit.
3. After each fragment is pinned and fixed to its stabilizing unit, it may be manipulated into its proper position in any plane and then fixed in this position by the connecting attachments.
4. Subsequent adjustments in the appliance can be made in any desired direction.

As with most new ideas there is usually a period of experimentation and overuse. First it is necessary to determine the extent of usage and the limitations of a new method or appliance. Although originally hailed as an answer to all prob-

Read at the twenty-eighth annual meeting of the American Society of Oral Surgeons, Miami Beach, Fla., October 9-12, 1946.

1. Anderson, Roger, Ambulatory Method of Treating Fractures of the Shaft of the Femur. *Surg., Gynec. & Obst.* **62**:865 (May) 1936.
2. Waldron, C. W., Fractures of the Mandible, with Special Reference to Reduction of Complicated Displacements and Subsequent Immobilization. *Journal-Lancet* **62**:228 (June) 1942.
3. Thoma, Kurt H., Fractures and Fracture Dislocations of the Mandibular Condyle: A Method for Open Reduction and Internal Wiring and One for Skeletal Fixation, with a Report of Thirty Cases. *J. Oral Surg.* **3**:3 (January) 1945.
4. Pincock, D. F., Horizontal Pin Fixation for Fractures of the Mandible Using Pin Guide. *Am. J. Orthodont.* **30**: Sec. Oral Surg. 67 (February) 1944.
5. Waldron, C. W., Kazanjian, V. H., and Parker, D. B., Skeletal Fixation in the Treatment of Fractures of the Mandible. A Review. *J. Oral Surg.* **1**:59 (January) 1943.
6. Ivy, R. H., and Curtis, Lawrence, Recent Experiences with Skeletal Fixation in Fractures of the Mandible. *J. Oral Surg.* **1**:296 (October) 1943.
7. Winter, Leo, Roger Anderson Skeletal Fixation for Reduction of the Posterior Fragment in Fractures of the Mandible. *D. Items Interest* **65**:958 (October) 1943.
8. Logsdon, C. M., Extra-Oral Utilization of Screws or Pins in the Immobilization of Mandibular Fractures. *J.A.D.A.* **30**:1529 (October) 1943.
9. Ingham, G. G., Extra-Oral Pin Fixations in Reducing Mandibular Fractures: Haynes-Griffin Splint. *D. Digest* **51**:247 (May) 1945.

lems of fracture management, it soon was found that, although skeletal fixation indeed filled in a large void in the accepted methods of jaw fracture treatments, especially where nonsupported fragments were present, it also had its limitations.[3]

Mechanical Requirements

Skeletal fixation is not indicated and should not be considered if simpler methods will fulfill the requirements. The factors of use and motility of the jaw during healing are not sufficient to overcome some of the objectionable features of the procedure, except in rare instances. Many times intermaxillary wiring is required, in conjunction with skeletal appliances, to assure a satisfactory result.

The actual mechanics of skeletal fixation frequently are difficult and involved. To apply a device properly so that it will be efficient often is not as simple as it appears, because there are a number of complicating factors and forces that, if not thoroughly understood, anticipated and thought out, will prove to be barriers to the operator.[3]

Only under ideal circumstances in the first place is the appliance as efficient as could be desired. The application, location and alinement of the pins, diameter and texture of the bone can cause its stability to vary greatly. Furthermore, the ideal location of the pins frequently is impossible due to the location and planes of the fracture.

The function of the appliance is to control the fragments and to maintain continuity of the parts. To accomplish this, two pins usually are inserted into each fragment some distance apart and at a noncontaminating distance from the fracture line. If the pins are inserted into the bone too closely together because of swelling, displacement of the part, inefficient planning or other factors, inadequate control of the fracture segment will be the result. The longer the segment, the farther apart the pins should be up to a certain point, at which twisting and torsional forces become difficult to control. In most cases, the distance between each point of insertion of the pins into the bone should not be less than ½ inch, or more than 2 inches. Bilateral fractures are stabilized more successfully by the use of two units in the median segment rather than by control with one.

Pressure Necrosis

Because there is a constant stress on the bone surrounding the inserted pin due to muscle pull, especially when the jaw is in use, pressure necrosis with subsequent loosening of the pin may result. This is more evident when the pins are improperly placed, especially if they are too close together or the bone is thin. The closer together the pins, the greater the leverage. If it is impossible properly to space the pins, additional immobilization of the parts by wiring the teeth in occlusion will reduce the strain on the bone.[2]

The pins must be inserted through the buccal plate and well into the lingual plate to provide stability. In most instances the operator easily can feel the pin drop into the medullary space before contacting the lingual plate, especially in the body of the mandible. The lack of this phenomenon in the bicuspid region may indicate an accurate penetration of the mental foramen. This has happened and resulting arteriovenous aneurism is on record. In the ramus, especially those of the thin variety, this orientation is not so evident, and here again exceeding thinness may indicate penetration into the mandibular sulcus. This also has occurred.

The accurate location of the pins is emphasized not only with respect to

mechanical requirements but also must be studied to avoid damage to important structures and distressing complications.

Damage to Mandibular Nerve

The most common accident is damage to the mandibular nerve with a resultant paresthesia. Frequently it is of prolonged and irritating duration. Accurate study of the roentgenograms is helpful in avoiding penetration of the canal as well as in keeping the pin insertion as close to the lower border as possible.[4]

Probably the most irritating complication is the necrosis of the skin surface around the pin, due to the pin's interference with the skin's normal position and motility. Often swelling and displacement are contributing factors. It is extremely difficult to insert the pins without displacing the skin to some extent. The manipulation necessary for reduction usually increases this tension on the skin surface. Frequently it is only after reduction has been accomplished and the swelling has subsided that this skin tension becomes evident. When allowed to persist, the pin eventually cuts its way through the tissue until the tension is overcome, and there is a resultant linear scar.

Even after the pins are inserted adequately it may be difficult to obtain an ideal reduction. This is true especially in edentulous cases. It is most discouraging to operate on a fracture in the edentulous case (especially the double type through the molar or bicuspid regions) and, when the external appearance seems to indicate good results, to find in the roentgenogram that a considerable displacement or separation remains.

Combination with Open Reduction

Many discouraging results in cases of this type have led to the conclusion that skeletal fixation alone is not adequate. The combination of open reduction to oppose physically and wire together the fractured surfaces and the use of the skeletal appliance to maintain immobilization has been one solution to the problem. To determine the necessity of this procedure is difficult, but it can be said that in the majority of double fractures in the body of edentulous mandibles, it will produce more satisfactory results.

Among complications to be considered is the penetration of a portion of the parotid gland with a resultant salivary fistula. Usually if no infectious process develops in this region of penetration it will heal eventually, but it can be most troublesome.

Cosmetic Effect

Finally, cosmetic results are important. Skeletal appliances do produce scars and, if complications are encountered, sometimes extensive ones.

In most instances other methods can be used in younger patients where cosmetics are more important, but even here are found situations where this method seems preferable.

No other appliance given to the profession of late has seemed to solve so many difficult problems and at the same time has presented so many possibilities of complication.[5]

Honest consideration should relegate it to a place where it rightfully belongs. It is a valuable adjunct to the dental armamentarium, but its use should be limited to a sphere where its advantages overshadow its complications.—*409 Professional Building.*

MANAGEMENT OF DIFFICULT EXTRACTIONS

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AN ORAL SURGEON may consider removal of a tooth to be the simplest form of oral surgery. Yet the extraction of teeth that are beyond the scope or ability of the general practitioner to remove provides him with a fair percentage of his work, and, when handled expeditiously, make his services appreciated by both the referring dentist and his patient. The busy dentist is relieved of embarrassment, loss of valuable time and any unpleasant reaction on the part of the patient.

The results of surgical removal are certainly to be preferred to the pain and misery which generally follow forceps delivery by strong arm tactics or the use of elevators by men who have no knowledge of proper instrument, shape, size or method of application. The greatest mistakes I have noticed in my thirty years' experience have been those associated with force applied before adequate space had been obtained by elimination of bone tissue distal and superior to the mandibular third molar. The more the roots curve distally or the greater the inclination in a distal direction in the vertical impaction, the greater the necessity of removing bone in order to effect easy elevator delivery with minimum resistance. These cases are best handled with about 99 per cent preparation and 1 per cent instrument delivery.

In cases in which the oral surgeon must complete work started by another operator, or in which, after the tooth has been removed by heroic methods, the patient is referred for treatment of postoperative complications as much diplomacy as medication must be used in order to smooth things over for the general practitioners who attempt to handle all patients who come to them. This state of affairs generally exists when times are bad and patients are not so numerous.

After many years of practice, sufficient experience is acquired to make an operator feel assured. What at first would be a difficult procedure can be handled later as routine work accomplished with self assurance. However, occasional cases will test to the utmost all of the specialist's knowledge and equipment.

Roentgenographic Examination

What tooth will be difficult to extract? Only roentgenographic examinations will tell. The roentgenogram may reveal heavy bone, sclerosed areas, large, tortuous or curved roots, if present, and the relation of the tooth in question to the approximating teeth and adjacent structures. Such a roentgenogram is an adequate basis for an opinion and a plan for the operation best suited for the patient.

The roentgenogram must be of good diagnostic quality. Sometimes the patient will furnish a picture taken in another office or in a hospital, which shows that only part of the tooth has been located by routine examination. Unless proper angulation has been employed the information may be misleading or worse than useless. Every oral surgeon has seen films that have not been placed far enough distally or have been deflected by the patient's fingers placed so low in the mouth

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that there is a clear view of the inferior border of the mandible but no sign of the tissue that actually imbeds the tooth, or of the conformation of the root. The roentgenogram may be of other members of the family, of the left side instead of the right, or improperly processed with fixing solutions that render it as useless as no film whatever.

A properly placed roentgenogram should be taken to compare with the one furnished by the referring dentist. In many instances the true cause of the complication has not been revealed, as may be shown when more tissue is examined at the proper angle.

In many cases several roentgenograms taken at different angles, as well as extra-oral views, are of paramount importance. The roentgenologist in the average hospital has no dental training and follows a poor technic in taking extra-oral lateral roentgenograms. Practically all films are exposed at an angle of 90 degrees to the sagittal plane, which results in superimposed shadows and great delay in fracture reduction. Although the pictures give satisfactory information on the nasal region they are inadequate aid in interpretation of pathologic conditions of the maxilla and mandible. Such roentgenograms should be taken at angles other than 90 degrees.

True bone density, shape, size and number of roots of the teeth must be known as well as their relation to structures to be avoided, such as the mandibular canal, the mental foramen, the antral floor and walls and defects in the surrounding bone, that is, diseased and fractured areas.

Premedication

Premedication in most surgical cases is advisable. If a difficult extraction is to be undertaken on an apprehensive patient, a great help will be found in sedation secured by the use of pentobarbital sodium 1½ to 3 grains. Aspirin is used post-operatively, an initial dose of 10 grains followed by 5 grains hourly if indicated. An 8 ounce glass of water should be taken with each dose. The use of too much medication and drugs that are incompatible should be avoided. Conferring with the patient's physician may be advisable.

Anesthetic Agent

The nature of each case indicates the anesthetic to be used. Many specialists prefer nitrous oxide and oxygen or thiopental sodium to procaine hydrochloride. Every operator knows what is the wisest choice for the good of the patient. I have found the Novocain-Pontocaine-Cobefrin mixture (Winthrop) satisfactory in the majority of cases in which a local anesthetic is to be administered, but occasionally I use 4 per cent Novocain with Cobefrin 1:10,000, and have had uniformly satisfactory results. Increasing the strength of the procaine is preferred to increasing that of the vasoconstrictor for more profound anesthesia.

Preoperative Care

If time permits, a prophylaxis should be given before operation. The tissues surrounding the area always must be cleaned and swabbed with Merthiolate (Lilly), mercurochrome or 3 per cent iodine, and generous use of an antispirochetal antiseptic will ensure more comfort postoperatively.

There are many instances in which the best interests of the patient are served by the surgeon's refusal to extract the tooth. The patient's temperature or local-

UMI

ized sepsis may require preoperative chemotherapy, and drainage before institution of other treatment may be the wisest course to pursue. Surgical judgment is a good part of the oral surgeon's armamentarium and its use dare not be sidestepped at any time.

Surgical Approach

The modern approach to the removal of impacted mandibular third molars is sectioning of the tooth so as to avoid loss of bone distally, which makes for a more comfortable postoperative wound, as trauma is minimized and operative time is reduced.[1-3]

Operative Procedure

In extracting teeth the surgeon should know under what conditions to employ or ignore the usual approach, and in what circumstances reversing the order of the procedure will achieve the best results. Any tooth that resists normal forceps or lever force should be removed surgically. The buccal or labial flap should be reflected to expose the overlying bone generously. This flap should extend at least the space of a tooth or two both mesially and distally beyond the tooth to be removed. In incision of the mucoperiosteal flap good vascular supply must be respected, and the cut must be to the bone so as to reflect these two membranes as one. Sharp periosteal elevators prevent tearing and eliminate trauma. Care must be exercised by an assistant in reflecting and holding the flap back. A broad retractor should be used or a suture may be employed to tie the flap away from the field of operation. The less handling the periosteum is subjected to, the better the postoperative healing. Aspiration of blood and fluids is preferable to sponging.

The bone may be removed either by chisel and mallet or by use of the mechanical impactor. Some operators prefer to use a surgical drill and to puncture the outer plate before using the chisel on bone that is relatively thick. The window created must be sufficiently adequate in size to reveal the roots, and sufficient approach should be provided to eliminate associated diseased tissue in its entirety.

More bone of necessity must be removed in case of large hypercementosed roots than in the presence of divergent or markedly curved roots, which may be sectioned to facilitate removal, thereby conserving valuable alveolar structure. The opening must be smoothed, spiculae must be removed and protruding bone reduced. The area should be flushed with warm normal saline solution, wiped with Merthiolate and frosted with a mixture of equal parts of sulfanilamide and sulfathiazole powder into which 20,000 units of penicillin powder has been added. This powder is kept in a powder atomizer. The light frosting of the mixture is taken up more readily by the tissues if the socket is moist with lymph or blood. Regions devoid of seepage of blood may be encouraged to bleed by scarification. However, the procedure would be unwise if infection is known to be present.

The flap then is returned to position and sutured, as few sutures as possible being used. If the bone tables are generous and enough blood is present, suturing is unnecessary in some cases. In instances in which the area is extensive and there

1. Pell, G. J., A Tooth Division Technic for the Removal of the Mandibular Third Molar, *J.A.D.A.* **21**:227 (December) 1941.
2. Pell, G. J., Classification and Technic for the Removal of Impacted Mandibular Third Molar, *J.A.D.A.* and *D. Cosmos* **25**:1594 (October) 1938.
3. Pell, G. J., and Gregory, G. T., Report on a Ten-Year Study of the Tooth Division Technic for the Removal of Impacted Teeth, *Am. J. Orthodon. (Oral Surgery)* **28**:660 (November) 1942.

is a loss of supporting bone, the concavity of the outer surface may be supported to normal shape by the use of Gelfoam (Upjohn) into which suitable medicaments may be added.

Postoperative Care

All pathologic tissue should be studied histologically. Many large wounds should be treated as open wounds. Complete closure is not always advisable. Daily irrigation and change of dressings are necessary.

Drains are inserted only if infection exists. On the second or third postoperative day a small probe passed between sutures may disclose the need for drains if none were inserted at the time of operation.

If a socket dressing is indicated I use a mixture of Benzocaine, Chlorobutanol (Merck), Thymol Iodide (Merck), guaiacol and oil of wintergreen, incorporated in a suitable paste form. It closely resembles the natural consistency of a well organized blood clot, permits drainage, is anesthetic and antiseptic in its action and is easily retained if the temperature of the mouth is not elevated above normal. Flushing the mouth with warm water readily removes this material. Two or three dressings are sufficient. In cases of extreme pain, codeine ½ grain every three or four hours will keep the patient comfortable.

Should the operative site be close to the inferior alveolar nerve, it may be well to warn the patient that postoperative paresthesia may result and to assure him that he need not be unduly alarmed by the symptom.

Postoperative bleeding, although beneficial, may be alarming to the patient. Therefore, he should be properly instructed in its control. If chemotherapy is indicated, I choose penicillin and use the Romansky formula. The results are more satisfactory than those obtained by use of the sulfonamides.

Postoperative roentgenographic checkup is a must. The operator should insist on the return of the patient for inspection and treatment.

Instruments

As before stated, what may be a difficult extraction for one operator may not tax to extremity the skill of another. I believe that the average exodontist has a greater variety and number of special instruments than the rest of the dental specialists combined. Keeping instruments sharp gradually reduces them in size, so that over a period of time we may have small, medium and large sizes of instruments that are ideally suited mechanically to any case. Large-bladed elevators would bind, unduly traumatize and fail to deliver a root.

Lever technic that will reflect the periodontal gingiva and produce a limited motion prior to a high alveolar application of sharp forceps that have been ground to the correct conformation of the tooth greatly will reduce the tendency to fracture. If a root has fractured, for example, the palatal root of an upper molar, the apex may be removed by entrance of a No. ½ or No. 1 round drill into the root canal and by clogging the burr as the engine stops. This procedure minimizes time and effort, for even the small thin-bladed displacing instruments designed by Fred Miller, as well as other apex levers, although advantageous if roots are fractured at an angle, may bind if the fracture is at a 90 degree angle to the long axis of the root. Use of a coarse broach or a No. 17 explorer may be all that is necessary if aspiration has been of no avail. Bone compressed by levers or gouges must be removed by curettage.

Many cases cannot be completed at once. Two-stage operations are preferable

to resultant bacteriemia or a surgical insult to weakened tissues in a debilitated patient. In this regard, adequate vitamin intake and proper diet should be considered.

Difficult Extractions

The following list comprises conditions in the presence of which extractions would be difficult. Many such extractions should be performed in the hospital.

Impactions with or without pericoronal infections.

Teeth with areas of acute or chronic disease of the alveolus.

Dentigerous and radicular cysts and odontomas.

Deeply retained roots.

Multiple supernumerary teeth, particularly in children.

Any tooth in patients with blood dyscrasias.

True ankylosis, diabetes, nephritis, subacute bacterial endocarditis and cancerous lesions for which roentgenotherapy has been instituted.

Retained teeth or roots in the aged or cachectic.

Fragile, friable bone or teeth.

Teeth displaced into the antrum or mandibular canal.

Teeth having cemental defects or hyperplasia of the cementum.—*118 North Eighth Street.*

Implantation of Fascial Strips through the Masseter Muscle for Surgical Correction of Facial Paralysis. N. Owens, in *Plast. Reconstr. Surg.* 2:25, 1947.

Facial paralysis presents a psychologic as well as a physical condition. The imbalance of the facial muscles results in great distortion on any attempt at expression.

Psychologically, inferiority complexes and morose dispositions frequently develop. Injuries to the facial nerve, either accidentally or due to radical surgical procedures, are increasing. Many operative procedures have been attempted to offer relief in these cases. Two fundamental procedures remain—muscle transplants, and support by fascial strips.

The literature is reviewed in detail. The purpose of surgical intervention is twofold: to give support to the involved side of the face, and to offer reanimation. To secure these objectives, muscle pull must be associated with the supportive features. The use of the masseter muscle is indicated since it is powerful and close to the paralyzed muscles.

Fascia lata strips about 25 cm. long and 1 cm. wide are formed into loops. Three loops are used. An incision is made exposing the masseter muscle, and this is connected by tunneling with a small incision in the upper lip past the midline on the unaffected side, a small incision in the lower lip past the midline on the unaffected side, and an incision at the corner of the mouth on the affected side. The free ends of each loop, are passed from the smaller incisions subcutaneously to the incision over the masseter. Then one free end of each loop is passed through the body of the masseter muscle. The ends of the loop are drawn taut to elevate the lip and angle of the mouth about 1.5 cm. The fascial loop is knotted and securely fixed into position by interrupted No. 30 white cotton sutures. The skin wounds are closed. Support to the lip for from sixteen to twenty-one days is given by gauze strips fixed with collodion.

A report of 11 operations for facial paralysis is given. The author states: "The operation which offers support and reanimation in cases of facial paralysis by means of fascial strips which connect paralyzed muscles with a functioning masseter muscle is the operation of choice."—Earl H. Klabunde, M.D., in International Abstracts of Surgery, *Surg., Gynec. & Obst.* 85:297 (September) 1947.

UMI

THE USE OF DRUGS IN EMERGENCY CASES

H. L. Hubinger, D.D.S.,
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AN ATTEMPT WILL BE MADE to evaluate the use of drugs in cases that require emergency measures to sustain vital functions. If the proper precautions are observed in the majority of oral surgery cases that require them, it is seldom necessary to resort to the administration of any parenteral drug, stimulant or depressant to maintain life.

Preoperative Care

Prior to any surgery it is imperative to know the state of health of the patient. Patients with cardiac, circulatory or respiratory dysfunction require individualized preoperative care before being subjected to anesthesia or surgery. The need for resuscitative measures is greater with the use of general anesthesia, but rarely is it necessary to resort to so-called cardiac and respiratory stimulating drugs. Artificial respiration with forced oxygen and carbon dioxide are used, comparatively speaking, more frequently as emergency measures during or following general anesthesia.

Patients who require unusual precautions for treatment may be accompanied by their personal physicians, for in the event of any accident the burden of responsibility is easily shared. The patient's physician always should be consulted when any doubt exists as to the severity of the underlying systemic disease. When an emergency does occur, its solution is a matter of personal judgment and knowledge, and on such occasions one's capabilities are best measured by himself.

No attempt will be made to analyze completely or to describe the pathologic or physiologic phenomena that produce the need for emergency measures. However, it would seem obligatory that a thorough knowledge of the various pathologic conditions that may arise, usually within the cardiac, circulatory or respiratory systems, is a prerequisite to avoid experimentation in any case of emergency. Certainly one must be familiar with pharmacology in the use of various drugs.

Drugs and Their Actions

Atropine.—A knowledge of the actions of atropine is a classic lesson in pharmacology, anatomy and physiology. According to Sollman,[1] its chief action is on the peripheral distribution of the parasympathetic (craniosacral autonomic) nerves, and its paralyzing action appears to be on the peripheral receptive mechanism (myoneural junction). From this one may deduce that it does decrease respiratory mucous secretions; it lessens the possibility of bronchiolar and laryngeal spasm, and by its action on the vagus innervated carotide sinus it must lessen its hypersensitivity and thus inhibit bradycardia. However, single therapeutic doses (1 mg. or 1/60 gr. hypodermically) usually does not affect the pulse rate materially; but ordinary experimental doses greatly increase the rate of heart

1. Sollman, Torald, *A Manual of Pharmacology*. Philadelphia: W. B. Saunders Company, 1942.

beat by paralyzing the vagus endings.[1] The paralysis of the vagus endings indicates atropine (1/60 gr. hypodermically, repeated as needed) in conditions of excessive stimulation of the vagus, such as operations around the trunks of the vagus.

Goodman and Gilman[2] state that the facts do not support the contention that reflex vagal activity is inhibited. In the first place, the therapeutic dose (0.3 to 0.5 mg. hypodermically) of atropine is insufficient to block the peripheral action of the vagus on the heart; and, secondly, the arrhythmias produced by chloroform and certain other vapors are not due to vagal impulses. The nerve impulses which may assist in causing these cardiac effects are mediated through the sympathetic pathways. The main purpose of the drug is to prevent excessive secretions of the respiratory tract and salivary glands, but it also acts as a mild respiratory stimulant.

Atropine definitely has a place in anesthesia with ether and similar vapors; when given in sufficient dosages, in operations that involve any manipulations around the neck, and in administration of thiopental sodium (Pentothal Sodium, Abbott) where central respiratory and cardiac depressions do occur. There is some controversy among anesthetists and operators as to the value of atropine with the use of barbiturates, Evipal Sodium (Winthrop) and Pentothal Sodium in general anesthesia. Perhaps the difference of opinion arises from the variations in method of administration of the anesthetic drug or the plane of relaxation or depression desired. Pharmacologic evidence supports the tenet that atropine in sufficient or repeated therapeutic doses reduces incidence of laryngospasm, and it does tend to stimulate the cardiac rate by its inhibiting effect on the vagus, perhaps reflexly. Some contend that it must be given prior to Pentothal Sodium.[3]

Weiss and associates (1936) have shown that therapeutic doses of atropine abolish the vagal type of syncope as a result of abnormally active carotid sinus reflexes.[2] With regard to reflex vagus activity, investigators are not entirely agreed as to the complete innervations of the carotid sinus, but most outstanding investigators agree that the carotid sinus is supplied with branches from the glossopharyngeal, vagus and cervical sympathetic nerves, and occasionally by a few branches from the hypoglossal.[4]

Guedel has stated that under ordinary circumstances atropine has no place in nitrous oxide or ethylene anesthesia.[5] These agents do not cause excessive mucous or salivary secretions. With the relatively light plane of anesthesia in the use of nitrous oxide, there is a rise of blood pressure and an increase of cardiac activity for lack of oxygen and an increase of epinephrine because of excitement, fear or struggling. Such effects being present, there is no need to suppress cardiac inhibitory activity.

A 10 to 20 per cent cocaine, or 5 per cent butyn, solution may be sprayed in the oropharynx, and the vocal cords and adjacent tissues may be painted with the topical anesthetic agents to prevent laryngospasm.[6] Recently curare (Intocostrin, Squibb) has been used to supplement Pentothal Sodium for more complete peripheral surgical relaxation.[3,7] Curare has no central action.

2. Goodman, Louis, and Gilman, Alfred, *The Pharmacological Basis of Therapeutics*. New York: Macmillan Company, 1941.
3. Schultz, P. E., and Guralnick, W. C., Advances in General Anesthesia: Pentothal Sodium and Curare. *J.A.D.A.* **36**:140 (February) 1948.
4. *Smith, H. L.*, A Consideration of the Hyperactive Carotid Sinus Reflex Syndrome. *M. Clin. North America* **31**:841 (July) 1947.
5. Guedel, A. E., *Inhalation Anesthesia*. New York: Macmillan Company, 1947.
6. Wilson, J. H., and Helmore, F. E., Balanced Anesthesia in Oral and Maxillo-facial Surgery. *D. J. Australia* **18**:271 (May) 1946.
7. Tuohy, E. B., Anesthesia for Abdominal Surgery. *J.A.M.A.* **135**:751 (November) 1947.

Cases of death in young children undergoing general anesthesia have remained unexplained. It has been a more or less routine practice to take roentgenograms of infants for any thymic enlargement before administering prolonged or deep anesthesia. The constitution known as "status lymphaticus" has been recognized for many years, and many of these deaths have been attributed to this lymphoid diathesis. Apparently there is little or no evidence to substantiate the contention that death occurs on account of thymic enlargement. More recently it has been found at necropsy that some of these same children have abnormally small adrenal glands. It is true that when death, attributed to this cause, occurs it resembles that type of death which follows shock or generalized circulatory collapse. It has been suggested that the condition known as status lymphaticus be renamed hypo-adrenia. Based on these findings, the use of desoxycorticosterone (adrenal cortex extract) also may be indicated for these cases before surgery or prolonged anesthesia is attempted. Goodman and Gilman remark that clinical evidence is too meager to warrant a definite conclusion that desoxycorticosterone is of value.

Scopolamine.—The action of scopolamine is much like that of atropine, except that it is mainly sedative and its effect on the vagus is relatively weak. Along with morphine as a premedicant, it may produce considerable narcosis, respiratory activity may be depressed considerably and it may cause marked fall of blood pressure.

According to Goodman and Gilman, studies in the human being do not support the contention that scopolamine is a respiratory depressant. Sollman states that sometimes it intensifies the respiratory depression of morphine to a dangerous degree. The combination as premedication for general anesthesia requires good judgment and evaluation before administration, and it may be indicated for the patient with hypertension. They may be used to advantage in prolonged operative procedures under local anesthesia. The main disadvantage with the use of scopolamine is that the patient may manifest excitement or delirium.

Morphine.—Morphine attenuates pain, allays apprehension and in general depresses all metabolic activity. The rate of respiration is slowed down generally. The dose per pound of body weight is directly proportional to the metabolic rate. With a low metabolic rate, as in hypothyroidism, morphine may paralyze respiration in an apparently well developed adult. With a high metabolic rate, morphine (gr. 1/4) will make little impression.[5]

While administered quite routinely, its use and amount require judicious application. This opiate does have its side reactions, such as constipation, nausea, gastric disturbance and occasional excitement. Its chief therapeutic use is the narcotic effect which is manifested by analgesia and sometimes sleep.

When any stimulant and especially depressant drugs are administered, some concern is given to the metabolic state of the patient. Many times the age, general appearance and demeanor of the patient may be considered as sufficient to estimate the metabolic state. An adequately compiled history with emphasis on previous medical or surgical care, eating and drinking habits, physical activities and emotional disturbances will add much to determine the amount of sedation required prior to general anesthesia. Hyperthyroidism, fevers, pregnancy, emotional upsets and physical activity are some of the many conditions during which a high basal metabolic rate usually is shown. Hypothyroidism, mental lethargy, debilitation and senility may produce a low basal metabolic rate. It is hardly

necessary actually to determine the basal metabolic rate unless thyroid disease is thought to be present.

A simple formula for determining the basal metabolic rate is suggested by Read: ¾ (¾ P.R. plus P.P.) minus 72 equals the B.M.R. (basal metabolism rate), with P.R. as the pulse rate and P.P. as the pulse pressure (systolic pressure minus diastolic pressure). If the B.M.R. calculated by this formula is beyond a range of minus 20 per cent to plus 20 per cent, it should be determined by more accurate methods.[8]

Nitrous Oxide.—Aged patients or those with low metabolism easily are anesthetized with nitrous oxide to the proper plane of anesthesia with satisfactory oxygen (about 10 per cent) content of the gas mixture. However, patients with high metabolism rates require greater amounts of oxygen in the mixture to supply adequate tissue respiration. The oxygen in the mixture can be increased only at the expense of the nitrous oxide, so it becomes practically impossible to carry a patient of high metabolism to a suitable plane of anesthesia with nitrous oxide.[5]

When used as a synergist or in premedication, the action of morphine on respiration always must be considered. Death occurs from respiratory failure in morphine poisoning. The treatment for morphine poisoning and, in general, for barbiturate intoxication is largely a matter of stimulating respiration. This is accomplished by the use of caffeine and sodium benzoate (0.5 Gm. or 7 gr.) given intramuscularly, and ephedrine sulfate (20 to 40 mg.) intramuscularly or injected slowly if given intravenously. Ephedrine is not only a general medullary stimulant, but it also raises blood pressure and tends to lessen narcosis.[2] Forced oxygen by inhalation is essential and always should be available. A mechanical respirator supplying 5 per cent carbon dioxide and 95 per cent oxygen is ideal.

Metrazol.—Probably pantamethylenetetrazol (Metrazol, Bilhuber-Knoll), of the group that includes nikethamide (Coramine, Ciba) and picrotoxin, enjoys present day acceptance as the emergency drug used for stimulation of respiration. It is administered intravenously in fractional doses of 1 cc. of a 10 per cent aqueous solution at five minute intervals until muscular twitching occurs.

Coramine.—Wood favors Coramine in that it is much safer and a much weaker drug than Metrazol.[9] He has administered on several occasions 5 cc. of Coramine intravenously and repeated it every five minutes for a total of 30 cc. without any heart fibrillation or bad effect. With regard to Metrazol and Coramine, Sollman remarked that they have little effect unless their dosage approaches the convulsive and that therapeutic claims tend to go beyond this rather limited field.

Epinephrine.—Epinephrine (1 cc. of 1:1,000 solution) may be used in cardiac arrest or failure as a stimulant and is injected directly within the heart chamber by the use of a long needle through the fourth interspace on the left. Epinephrine is toxic to heart muscle and therefore should not be injected within it.[8] If heart sounds are still audible, then 0.05 to 0.2 cc. of a 1:1,000 solution may be diluted and injected slowly intravenously. Epinephrine is used for the relief of acute paroxysms of bronchial asthma. The aqueous solution (0.2 to 0.5 cc. of a 1:1,000

8. Burket, L. W., *Oral Medicine*. Philadelphia: J. B. Lippincott Company, 1946.
9. Wood, Paul, Anesthetic Office Experiences. Proc. American Society for Advancement of General Anesthesia in Dentistry, March, 1943.

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solution) may be injected subcutaneously. For general anesthesia in asthmatic patients, Arrowood recommends open administration of ether.

The Xanthines.—Myocardial stimulation produced by the xanthines (caffeine, theophylline, theobromine) has relatively little therapeutic application. Caffeine does stimulate centrally, but its peripheral action and side effects have a tendency to mask the central actions. When vital centers are depressed, as in morphine poisoning, the stimulating action of caffeine on the centers is quite marked.

Digitalis.—Digitalis and certain closely allied drugs have in common a specific and powerful action on the myocardium which is unrivaled in value for the treatment of heart failure.[2] Its use and value are in prophylaxis and not in the realm of an immediate emergency drug. The ideal dose is discoverable only in careful daily observation of the patient. The most important use of digitalis is in congestive heart failure.

Ammonia. —For simple cardiac respiratory depression, as in benign syncope, 15 minims of aromatic spirits of ammonia in water may be given orally, or the spirits may be inhaled.

Amyl Nitrite.—Amyl nitrite pearls as an inhalant or nitroglycerine (1/100 gr. tablets) under the tongue should be given for patients with precordial pain as in angina pectoris. Morphine may be given for relief of pain. Amyl nitrite also is effective in epileptic seizures. Epileptic patients should be given premedication of diphenylhydantoin sodium (Dilantin, Parke, Davis) and barbiturates before being subjected to operative procedures, and for the patient in convulsion an intravenous barbiturate, such as Pentothal Sodium, may be given.

Drugs for Emergency Use

In conclusion, drugs that should be available for emergencies are morphine sulfate, caffeine and sodium benzoate, Coramine, amyl nitrite, sterile epinephrine, ephedrine sulfate, aromatic spirits of ammonia, and a barbiturate for intravenous administration. Oxygen is indispensable.—*502 Second National Bank Building.*

10. Arrowood, J. C., Management of Anesthesia for Oral Surgical Operations on the Hospitalized Patient. *J. Oral Surg.* 5:305 (October) 1947.

HEMANGIOMA OF THE CHEEK

Daniel J. Holland, Jr., D.M.D.,
Brookline, Mass.

OCCASIONALLY swellings or discrete masses are diagnosed as tumors when they are, in reality, enlarged lymph nodes caused by acute or chronic inflammation within or around the mouth or throat or in other parts of the head and face. Many such lymph glands when normal are not palpable, but when reacting to infection along the efferent lymphatics they enlarge and are soft and tender when the infection is acute, or firm and hard when the infection is chronic.

The following case history is presented to emphasize the importance of careful examination in making differential diagnoses between tumor masses and adenopathy.

History.—A man, aged 62, was referred to the oral surgical clinic with a letter from his local dentist advising treatment of a "growth on the right inner cheek." He complained of pain and localized swelling of the right cheek recurring at intervals throughout an entire year.

The remaining maxillary teeth had been extracted two years previously because of periodontoclasia and periapical pathology.

Fifteen months previously a maxillary acrylic denture was made which fit well and was comfortable. About three months after the denture was inserted, the patient experienced repeated attacks of swelling and tenderness in the right buccal fold in the region of the second and third molars. At this time he also noticed a soft, slightly tender mass in the right cheek. The signs and symptoms were attributed to the denture flange which had been ground for relief.

The swelling and tenderness in the buccal fold subsided and recurred at intervals, but the mass in the cheek persisted, becoming harder and larger. Roentgenograms were reported negative.

The local dentist made a diagnosis of "tumor" and referred the man to the hospital for excision.

Examination.—The patient was well developed, well nourished, apparently healthy and appeared to be in no distress. There was a soft, diffuse, nonfluctuant swelling of the right cheek

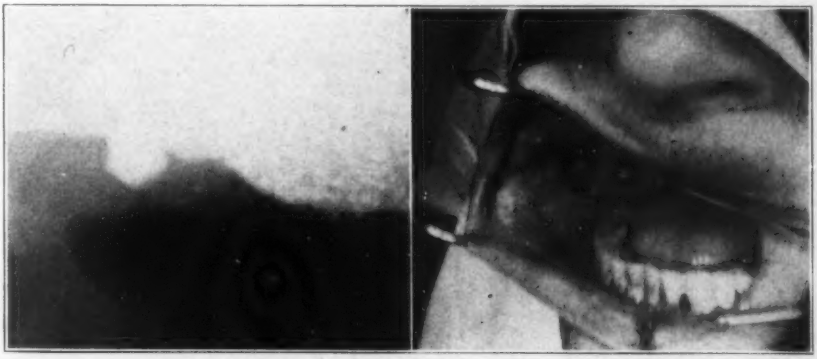

Fig. 1.—Left: Intra-oral roentgenogram, showing retained root fragment and periapical granuloma. Right: Mass diagnosed as a lymph node, dissected free and ready for excision

with a central, hard, firm, freely movable, 1 by 1 cm., round, marble-like mass. The mass which, intra-orally, was below and slightly posterior to Stenson's duct orifice could be rolled around by palpation. There was tenderness and some edema in the buccal sulcus in the second and third molar regions, but no ulceration nor fistula. Stenson's duct was patent to a No. 1 salivary duct probe and clear saliva was expressed. There was no external swelling in the parotid gland.

The temperature was normal. The reaction to the Hinton test was negative. Roentgenograms revealed a retained root fragment in the maxillary right third molar region. The root was surrounded by apical rarefaction (Fig. 1, left).

A provisional diagnosis of buccinator lymph node enlargement was made (Fig. 1, right).

Operation.—With the patient under local anesthesia, the mucoperiosteum in the third molar region was reflected, exposing the retained root fragment. Attached to the apex was a well defined periapical granuloma. A granulomatous tract extended from the root socket laterally to the cheek tissue. The incision was sutured with Dermalon (Davis and Geck).

Next, the region of the buccinator mass was infiltrated with 1 per cent monocaine hydrochloride, and a 3 cm. horizontal incision was made in the midbuccal mucosa over the mass. An encapsulated, firm, bluish gray mass was freed by dissection and excised. Several bleeders were ligated with No. 00 catgut, and the incision was approximated with interrupted Dermalon sutures.

After an uneventful convalescence the sutures were removed on the sixth postoperative day. The pathologic specimen was described as typical hemangioma (Fig. 2).

Comment.—Without careful roentgenographic examination the retained root fragment would not have been discovered. The provisional diagnosis of hyperplastic buccinator lymph node related to chronic infection around a retained root fragment seemed to be verified. The definite diagnosis of hemangioma could not have been made without microscopic analysis.—*1180 Beacon Street.*

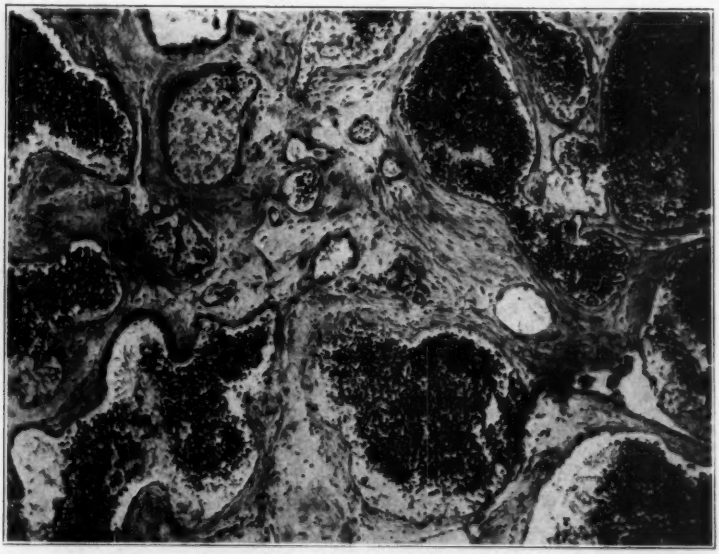

Fig. 2.—Low power (x 8) photomicrograph, showing tumor mass made of numerous channels filled with blood and lined with endothelium. The stroma is fibrous and the microscopic findings are characteristic of hemangioma

ENUCLEATION OF A DENTIGEROUS CYST WITH RETAINED VITALITY OF TEETH

Sheldon I. Brockett, D.D.S.,
San Diego

A GIRL, aged 11, was referred by her dentist on October 27, 1941, to have an abscessed lower left second molar removed.

History.—An intra-oral roentgenogram of this region was sent with the patient, which revealed that the delayed exfoliation of this tooth evidently had caused a tipping distally of the permanent second bicuspid. There also was a region of radiolucency of a slight degree distal to the second bicuspid. A second intra-oral roentgenogram was taken, and the radiolucency seemed more intense.

Examination.—Examination of the mouth revealed a small abscess buccal to the deciduous molar. The buccolingual dimension of the left body of the mandible was much greater than that of the right. Palpation of the mucobuccal fold apparently indicated normal bone. There was no abnormality lingually on this side whatsoever, and the rest of the mouth was perfectly normal. External examination gave negative results.

Suspicion aroused by the two pictures previously mentioned and the increased thickness of the left mandible gave rise to the taking of a 5 by 7 inch extra-oral roentgenogram (Fig. 1, left) which showed a large dentigerous cyst approximately 4.5 by 2.5 cm. in dimension and extending from the left first bicuspid to the second permanent molar. It also revealed that this cyst, and not the deciduous molar, was the reason for the tipping of the second bicuspid.

Operation.—On November 1, 1941, the operative procedures were carried out under thiopental sodium (Pentothal Sodium, Abbott) anesthesia and consisted of extraction of the second deciduous molar, the second bicuspid and enucleation of the cyst buccally. After the cyst was removed, the roots of the first and second permanent molars plainly could be seen. These, however, were left in place as well as the first bicuspid in the hope that they would remain vital.

The region was packed with iodoform gauze saturated with petrolatum, and the field was

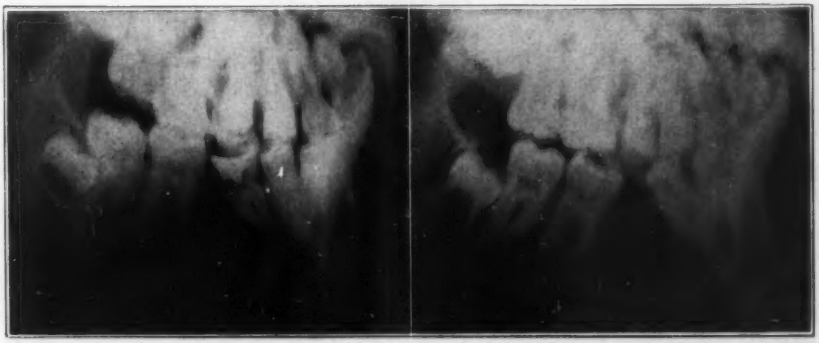

Fig. 1.—Extra-oral roentgenograms. Left: Large dentigerous cyst, extending from the left first bicuspid to the second permanent molar (October 27, 1941). Right: Postoperative view, showing that all teeth remained vital (May 1, 1943)

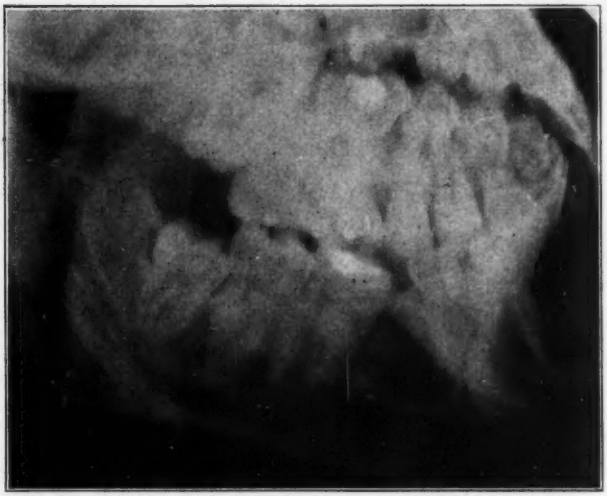

Fig. 2.—Complete regeneration of osseous structure. First bicuspid and first and second molars have remained vital (June 22, 1946)

closed with black silk sutures. Routine postoperative procedures consisting of irrigations and subsequent dressings were carried out, and the patient made an uneventful recovery.

The laboratory report substantiated the diagnosis. Pathologic examination showed "chronic inflammatory tissue with hemorrhagic areas present. Acute inflammation in areas. No evidence of malignancy."

A subsequent postoperative picture was taken on May 1, 1943, and it is interesting to note that all teeth were vital when checked with an electric vitality tester (Fig. 1, right).

Course.—The patient was seen last on June 22, 1946. The first bicuspid and the first and second molars have remained vital. The roentgenogram taken at this time reveals complete regeneration of the osseous structure (Fig. 2).—*2665 Fourth Avenue.*

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OSTEOMYELITIS OF THE ASCENDING RAMUS OF THE MANDIBLE

Edward C. Thompson, D.D.S.,
Urbana, Ill.

A WHITE MAN, aged 62, complaining of backache and sciatica, was referred by an internist for consultation regarding foci of infection. Full mouth roentgenograms (Fig. 1) were made, and the removal of all teeth was advised.

Examination.—The positive findings in a general examination were diabetes mellitus, chronic oral sepsis and suspected ruptured nucleus pulposus of the lumbosacral interspace. Although a previous reaction to the Wassermann test had been positive, at this date, August 23, 1945, his serologic reaction had been negative. The spinal fluid was negative. All other findings, laboratory and clinical, were essentially negative. The diabetes mellitus was relatively mild and was controlled easily by qualitative dietary restriction. Repeated urinalysis consistently showed no glycosuria.

Treatment.—It was decided to eliminate the oral foci of infection. Accordingly, on September 28 he was hospitalized, and all maxillary teeth were removed. Partial alveolectomy was performed with thiopental sodium (Pentothal Sodium, Abbott) as the anesthetic agent. Nothing noteworthy occurred during the operation, and recovery was uneventful.

On October 26 an attempt was made to anesthetize the patient and to perform a complete mandibular alveolectomy. The procedure was interrupted ten minutes after a normal induction with Pentothal Sodium because of cessation of respiration, accompanied by sudden marked cyanosis. Approximately 18 cc. of 2.5 per cent solution of the anesthetic agent had been administered. There was no further voluntary effort to breathe until approximately fifteen minutes later. During this period, oxygen under pressure and artificial respiration were administered to sustain life. The pulse became very weak and irregular and at times could not be detected. Soon after cessation of respiration, 1 cc. of nikethamide (Coramine, Ciba) was administered intravaneously with no noticeable effect. Approximately 0.5 cc. of epinephrine was injected into the pericardium, and thereafter it was possible to detect a more vigorous and regular pulse. Another 3 minims of epinephrine were administered intravenously and, in addition, slightly less than 1 cc. intramuscularly. Stimulation of the rectal sphincter was done. The patient finally resumed voluntary breathing after these measures, and pulse and respiration became satisfactory. However, when oxygen administration was discontinued, respiration again became shallow.

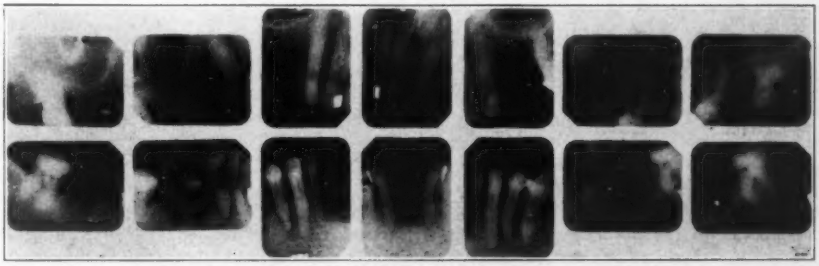

Fig. 1.—Roentgenogram, showing extensive oral infection in a man, aged 62, with mild diabetes (August 30, 1945)

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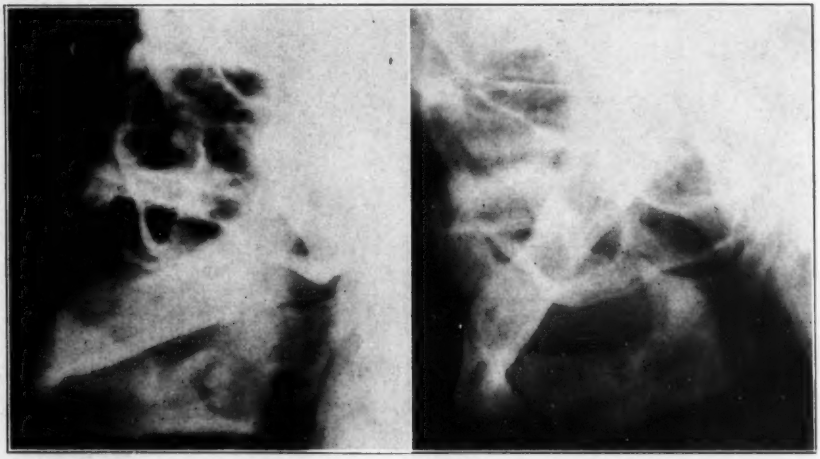

Fig. 2.—Lateral jaw roentgenograms. Left: Sequestration in the region of the angle and lower portion of the ramus (January 18, 1946). Right: Satisfactory regeneration of bone three and a half months after sequestrectomy (May 24, 1946)

Caffeine and sodium benzoate gr. 7½ was administered intravenously, and the patient became conscious approximately thirty-five minutes following induction.

It was decided to forego further general anesthesia, and the remaining teeth were removed with the aid of double mandibular block anesthesia. Conservative alveolectomy was performed. The patient was returned to his room in a drowsy state. On the next day he complained of soreness about the chest and abdomen. A partial explanation of the anesthetic complications was made. He was dismissed from the hospital, apparently convalescing, on October 28.

He returned for postoperative care on November 1 and complained of severe pain about the left angle of the jaw. There was little swelling and tenderness present about the face or gingivae. On November 3 he returned and described intense pain which seemed to center in the left ascending ramus of the mandible. Because of the previous difficulty in the management of the case it was urgent to control the patient's postoperative course and assure the most comfort possible. All linen, gloves and armamentarium had been changed after the anesthetic complications; nevertheless, osteomyelitis was suspected because of the realization that contamination likely occurred during the efforts at resuscitating the patient.

He was hospitalized again on November 4 and 20,000 units of penicillin every three hours were administered intramuscularly. A moderate cellulitis about the retromolar region and the angle of the mandible developed during the next two days. Temperatures as high as 100 F. were recorded, after which the temperature remained normal. The small phlegmon about the angle of the jaw persisted. The blood count on November 5 was as follows: hemoglobin 79 per cent; erythrocytes 3,840,000 per cubic millimeter; leukocytes 8,500 per cubic millimeter; with 76.5 per cent polymorphonuclear leukocytes and 4.5 per cent monocytes.

He was sent home on the tenth day after admission. The cellulitis had almost, but not entirely, disappeared. General improvement continued until he returned again on December 22, with moderate swelling around the lower left third molar region.

Dental roentgenograms disclosed an osteomyelitic region extending distally. This was confirmed by a roentgenogram of the left ascending ramus taken in the oblique lateral position. Another roentgenogram taken on January 18, 1946 (Fig. 2, left), indicated fairly definite sequestration. There had been no external incision for drainage, but two small retromolar sinuses had

developed within the oral cavity. These seemed adequate for drainage, and there was no interference until February 7 when the patient was placed under local infiltration anesthesia, and an incision approximately 2 inches long was made in the third molar and retromolar regions. Only one piece of sequestrated bone which appeared to be a portion of the medial aspect of the ascending ramus was removed. A small rubber dam drain was inserted and was removed several days later. Thereafter, the wound was allowed to close. The patient failed to return for roentgenograms, and on May 24 he was summoned for further roentgenographic examination. This indicated that bone regeneration was satisfactory (Fig. 2, right). The patient felt well and was wearing complete dentures.

Summary.—A case of osteomyelitis of the left ascending ramus of the mandible has been presented. It is believed that early penicillin therapy confined the extension of the infection to the relatively small region shown roentgenographically. More recent knowledge of penicillin therapy indicates that the dosage should have been greater. Early and adequate administration of penicillin evidently is of great value in the treatment of osteomyelitis of the jaw. Severe pain should call one's attention to its use.

The exciting and unfortunate course of anesthetic (Pentothal Sodium) administration probably in some manner resulted in contamination of the operative field, although the operating crew changed gloves, towels, sheets and equipment before completing the procedure with the use of local anesthesia. Because it was thought undesirable to alarm the patient unnecessarily, only a small series of roentgenograms were made.

It is necessary to note that this patient was mildly diabetic. The anesthetic complications might have occurred simply because of overdosage, but in our hands several diabetic patients have exhibited similar, though not so drastic, tendencies toward dangerous deep narcosis upon administration of Pentothal Sodium. A cautious technic of administration certainly should be employed.—*Carle Hospital Clinic.*

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Please mail this information to Dr. Harry Archer, Chairman, Hospital Dental Service Committee, 3811 O'Hara Street, Pittsburgh 13.

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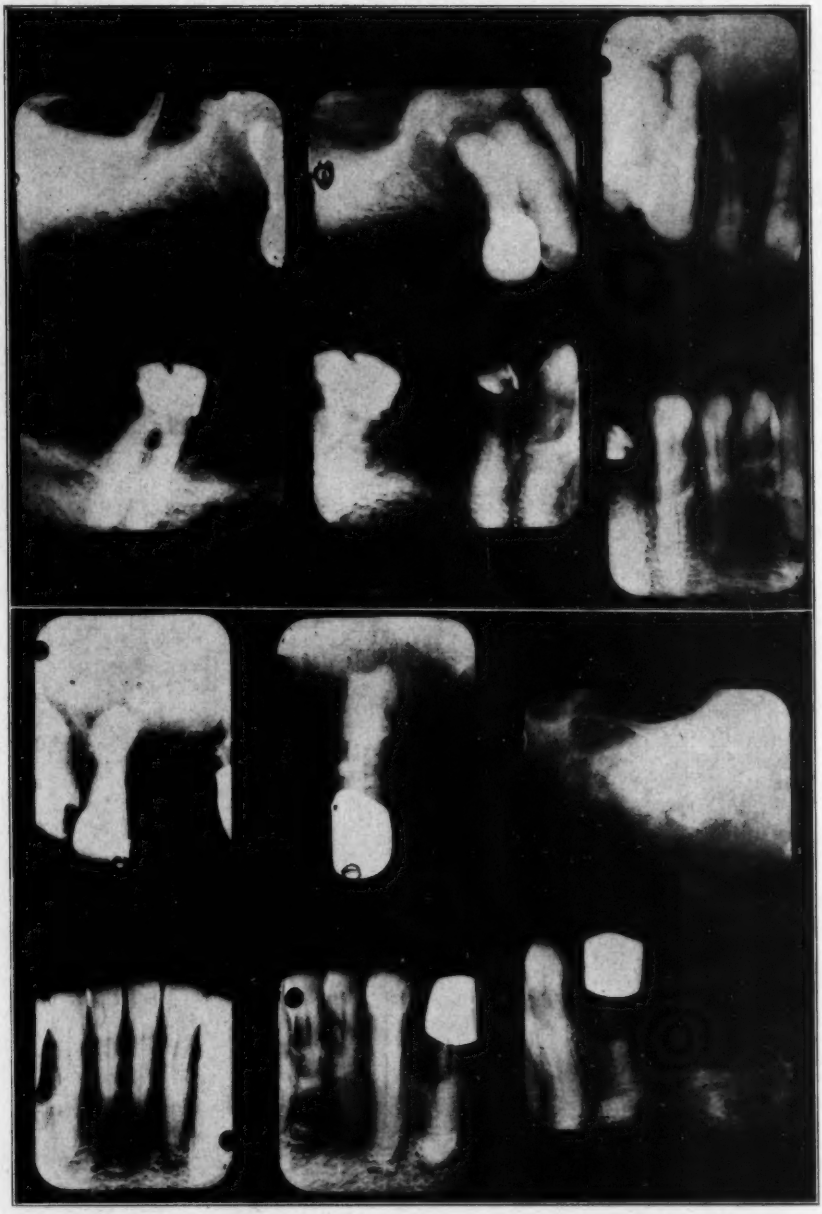

Fig. 1.—Dental roentgenograms, showing evidence of Paget's disease of the maxilla

MANIFESTATION OF PAGET'S DISEASE IN THE MAXILLA

Paul H. Hamilton, D.D.S.,
Los Angeles

On June 18, 1946, a colored woman, aged 67, complained of pain and tenderness in the regions surrounding her remaining teeth.

History.—The patient had had a fibroid uterine tumor removed twenty-three years previously. Her tonsils had been removed sixteen years previously. She had had measles, mumps, chickenpox, whooping cough and scarlet fever during her early childhood. The patient had been married for forty-two years but had no children. The menses had begun at 17 years of age and were regular until they ceased after the removal of the fibroid tumor.

The patient's father had died of tuberculosis, and her mother had died of a cardiac disease. She had four sisters, all of whom were alive and well. Her only brother had died, but the cause of death was unknown.

Examination.—The dentition was in a poor state of repair, and many teeth were missing. The maxilla was enlarged to the extent that on the labial and buccal surfaces of the alveolar process the mucous membrane appeared stretched so that the vessels were outlined distinctly.

The dental roentgenographic examination (Fig. 1) on June 18 showed from moderate to advanced resorption of the alveolar process around the remaining teeth. Five of the six remaining maxillary teeth presented hypercementosis. The maxillary bone revealed zones of almost uniform diffuse increase in density in which there was an apparent, very fine and almost confluent trabecular pattern. In the upper right molar region, there was an area which revealed several nodular appearing sclerotic portions.

There were no remarkable physical findings except for the signs and symptoms of Paget's disease which were: (1) the gradually increasing size of the head which had been noticed over a period of twenty-two years; (2) the complaint of vague pains experienced in the legs for seventeen years; (3) increased bowing of the legs for ten or twelve years; (4) gradual impairment of hearing for the past ten years, and (5) roentgenographic findings in the lower thoracic and lumbar spine including both hips and in the skull (Fig. 2), indicating an advanced case of Paget's disease.

Blood calcium and phosphorus were within normal limits. The phosphatase units were elevated greatly from a normal of 2 to 6 units to 20.2 units. The reaction to the Wassermann test was negative.

Microscopic Examination.—A fragment of bone was removed from the maxilla for biopsy. The section showed numerous trabeculae of moderately well formed bone separated by an abundance of edematous vascular cellular fibroblastic stroma. The bony spicules were lined by regular palisades of normal appearing osteoblasts. There were numerous osteoclasts occupying the bone lacunae and free in the stroma. The chief pathologic features seen were the abundance and cellularity of the fibroblastic marrow and the irregular poorly laminated deposition of bone in the bony trabeculae (Fig. 3).

Diagnosis.—Paget's disease of bone.

Treatment.—After administration of 2 per cent procaine anesthesia, the remaining maxillary and mandibular molars and bicuspid teeth were removed, beginning on June 24, with the final extraction on July 23. The healing of extraction wounds was uneventful. The patient was discharged from the dental clinic on August 26, 1946.

Results.—In this case of involvement due to Paget's disease of the maxilla, it is of interest to note that both the maxillary and mandibular bicuspids gave evidence of hypercementosis. However, in the maxilla the cuspids and one central incisor also had an excessive amount of cementum.—*1200 North State Street.*

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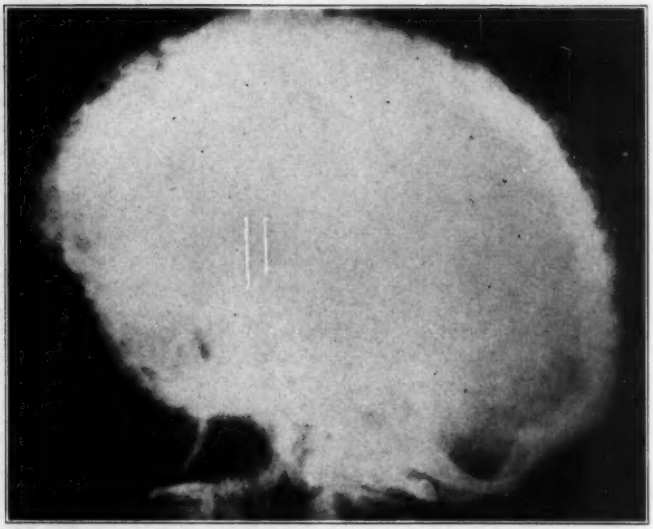

Fig. 2.—Lateral roentgenogram of the skull showing bone changes in advanced stages of Paget's disease

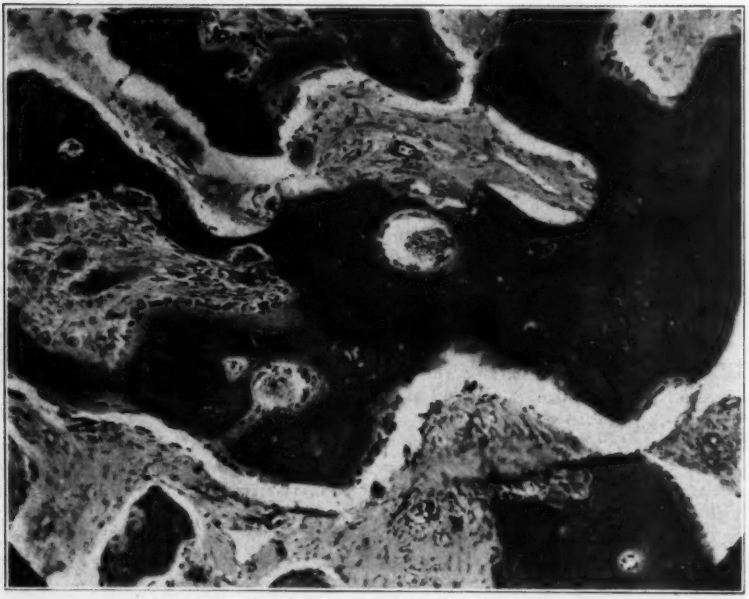

Fig. 3.—Photomicrograph of alveolar bone in Paget's disease

OSTEOMYELITIS:
A CASE OF CONFUSING ETIOLOGY

Alvin L. Armer, D.D.S.,
Hollywood, Calif.

A WHITE WOMAN, aged 26, who was apparently in good physical condition, was referred by her dentist for the removal of all third molars.

Examination.—The patient presented a clean mouth with a full complement of teeth. Mild pericoronitis was evident over each mandibular third molar. Roentgenographic examination disclosed that the mandibular third molars were embedded partially but were developed fully. The maxillary third molars had erupted and were normal in appearance. The density of the osseous structure was normal.

Treatment and Course.—The lower third molars were irrigated daily with saline solution, and iodoform gauze was placed beneath the flaps until the inflammation had subsided entirely. On October 29, 1938, with the patient under nitrous oxide and oxygen anesthesia, all four third molars were removed, and the lower sockets were dressed with ¼ inch iodoform gauze.

At 3 a.m. on October 31, the patient called and reported excruciating pain in the lower right side of the face, but no exact description or location of the pain could be ascertained. The sockets were irrigated with saline solution and were in a clean and normal state of repair. Therefore, the sockets were repacked with iodoform gauze and Conducto surgical dressing (Arthur E. Smith, manufacturer, Los Angeles). Morphine sulfate, ¼ gr., was administered hypodermically, but little relief was obtained. Morphine and codeine were given at intervals and routine irrigations were given daily. Changing of the dressing was continued until November 2. Until this date, there had been no swelling, and no indication of pathologic changes in the sockets remained.

On the afternoon of November 2, the patient's face began to swell on the right side along the anterior two-thirds of the body of the mandible. The periosteum was raised from the first molar forward to the first bicuspid. An ethyl chloride spray was used, and an incision was made along the mucobuccal fold. A rubber drain was inserted.

Then it was learned that the patient had had placed, just two days prior to the extractions,

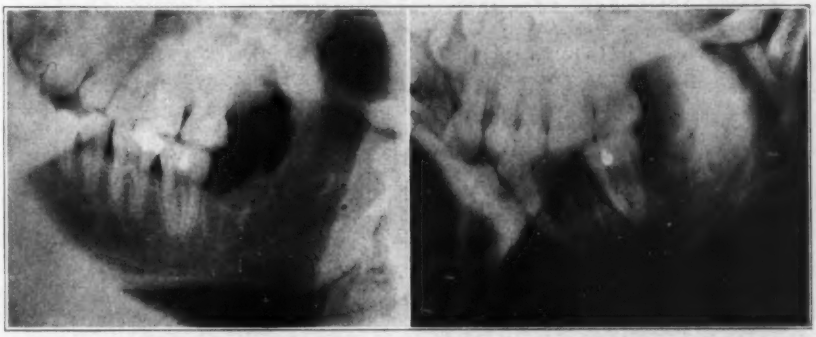

Fig. 1.—Lateral jaw roentgenograms. Left: Thickened periodontal membrane at the apex of the lower right first molar is shown (November 4, 1938). Right: Early osteomyelitis may be seen (November 17, 1938)

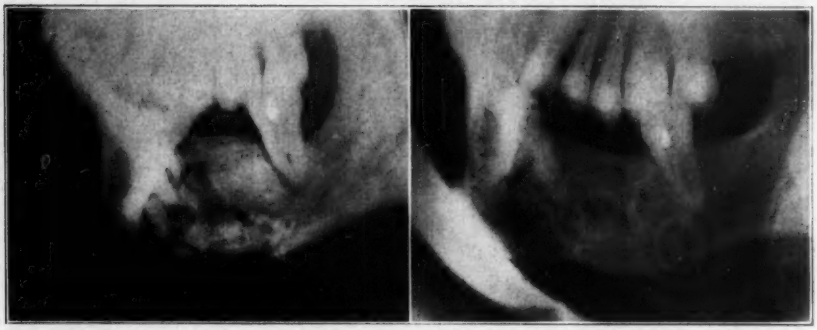

Fig. 2.—Lateral jaw roentgenograms. Left: Sequestra formation is evident (December 7, 1938). Right: Regeneration is complete (December 7, 1939)

a silver amalgam filling on the distal occlusal surface of the lower right first molar. The lower first molar was sensitive to percussion.

On November 4, 1938, the patient was brought to the office and roentgenograms were taken. They revealed a thickening of the periodontal membrane at the apices of the lower right first molar roots and in the bifurcation (Fig. 1, left). There was no indication of infection in any of the sockets.

The amalgam filling was removed, and the pulp canal was opened, bringing about considerable relief from pain. This was temporary, however, for three days later, November 7, the pain grew worse and was unbearable. Nitrous oxide and oxygen anesthesia was administered, the first molar was removed and the intra-oral incision was extended. The pain was relieved temporarily, but the swelling progressed and began to localize beneath the body of the mandible in the bicuspid region. The patient was hospitalized and on November 14 nitrous oxide and oxygen anesthesia was administered and a small incision was made for through and through drainage (about 1 inch incision placed extra-orally beneath the body of the mandible). Daily irrigations with saline and Dakin's solution were performed.

An extra-oral roentgenogram taken on November 17 disclosed the beginning of the "honeycomb" appearance (Fig. 1, right). Routine irrigations of saline, Dakin's solution and 10 per cent urea were used, and allantoin ointment was placed in the wound. Roentgenograms were taken on November 27, December 7 (Fig. 2, left) and 31 and January 23, to note progress and sequestra formation.

The conservative method of treatment was employed throughout, and as sequestra were formed completely, they were removed. Both bicuspids were lost in sequestra, but the second molar remained relatively sound. The major portion of the osteomyelitis was anterior to the second molar and distal to the cuspid. With the patient under nitrous oxide and oxygen anesthesia, on January 10 a large sequestrum was removed extra-orally from the bicuspid region.

The osteomyelitis had begun to subside and appeared to be under control. Routine treatment was continued, and granulation progressed rapidly. One more sequestrum was removed on January 24, with the aid of block anesthesia, and the patient was dismissed on February 15, 1939.

Result.—The mandibular second molar never was involved seriously, and it stands now as a functional vital tooth (Fig. 2, right).—*6331 Hollywood Boulevard.*

CONDYLOMATA LATA OF THE TONGUE IN CONGENITAL SYPHILIS

Malcolm Wallace Carr, D.D.S.,
New York

A GIRL, aged 11, complained of a sore tongue of six weeks' duration. She had received local treatment, the nature of which could not be determined, at another dispensary.

Examination.—Examination revealed a number of small, nodular, papillomatous, warty growths on the undersurface of the tongue at the anterior tip and extending posteriorly along the border of the tongue on the right and left sides as far back as the middle third (see photograph). The lesions were not inflamed and were not of the type that develop from chronic irritation. They were not ulcerated but appeared as small, cauliflower-like masses with moderate hornification. The maxillary central incisors presented characteristics typical of Hutchinson's teeth, with notched incisal edges and globular shaped crowns. The dentition otherwise was normal. The child was well nourished and normally developed. Complete physical examination revealed no other abnormalities of growth or function.

The appearance of the maxillary central incisor teeth suggested congenital syphilis, the diagnosis of which was confirmed by serologic examination. Reaction to the Wassermann test was 4+. The tongue lesions in this case were characteristic of syphilitic warts which result from hypertrophy of the papillae with thickening of the epithelial layers and are found in various surfaces of the mucous membrane. The patient was given intravenous injections of neoarsphenamine (0.3 Gm.) twice each week. Four weeks after treatment was started, the lesions had disappeared.

Family History.—It is desirable, in dealing with congenital syphilis, to trace the origin of the contagion. Accordingly, investigation was pursued in order to procure a complete family history. The family in this instance consisted of the father, the mother and one sister, aged 7, all of whom were examined.

The father had had gonorrhea fifteen years previously. Twelve years before, he had sustained

Fig. 1.—Condylomata lata of the tongue in a girl, aged 11, with congenital syphilis

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a fracture of the humerus, followed by infection (possibly osteomyelitis) requiring incision and drainage. There apparently was delayed union of the fracture. Seven years previously, he had had "six injections of 914." He gave no history of a primary lesion of syphilis. Reactions to the Wassermann and Kahn tests were negative.

The mother had had no serious illnesses in childhood or in later years. Fifteen years previously, she had had twelve injections "to help her put on weight." Twelve years previously (one year before her older child was born), she had had a miscarriage. The reaction to the Wassermann test was 4+. She gave no history of a primary lesion. Appropriate treatment was instituted.

Conclusion.—Careful clinical investigation and tracing of the origin of contagion in congenital syphilis, with follow-up of contacts in acquired syphilis, are responsibilities that must be accepted by everyone engaged in health service. It is practical to trace sources of infection and exposure in syphilis. By these measures a larger proportion of patients are brought under observation, the period of infectiousness is reduced and the ratio of secondary infection thereby is decreased.—*52 East Sixty-First Street.*

FACIAL PROSTHESIS

Many unsightly defects follow treatment of cancers of the skin of the face, the nasal cavity and maxilla, and surgical repair of some of these extensive defects is often technically impossible, inadvisable and not feasible for other reasons. Where the restoration has been obtained by a facial prosthesis, the surgeon can readily examine his patient and easily detect early recurrence. If the defect is corrected by surgery, the area is not accessible to examination and a recurrence may not be noted until it has reached considerable proportions. Many patients would prefer to wear a prosthetic appliance rather than endure the long period and expense of hospitalization and multiple operations. In any event, a facial prosthesis may be employed for temporary correction to carry the patient through such a period until it is deemed advisable to proceed with reconstructive surgical procedures.

The materials which are available at present for the prosthetic reconstruction of facial defects leave much to be desired, but a fair cosmetic result can nevertheless be obtained. These media include latex, acrylic resins and venyl resins, and others. In my experience venyl resins have given the most satisfactory results since they are more durable than the other available materials.—A. J. Ackerman, in *Am. J. Roentgenol.* 59:550 (April) 1948.

UMI

BOOK REVIEW

Textbook of Microbiology. By Kenneth L. Burdon, Ph.D. Third Edition. 728 pages. Price $3.50. New York; The Macmillan Company, 1947.

The author has undertaken a complete revision and some rearrangement in a comprehensive yet understandable account of all principal types of micro-organisms, as well as important infectious diseases. The type and form of presentation was designed for student nurses, specifically, but also for others newly interested in the study of microbiology.

The contents are divided into four parts, the first of which deals with the historical background, classification and present methods of study of micro-organisms. The second describes methods for destruction of these agents and controlling the spread of communicable diseases. The third part briefly presents the principles of infection and resistance including the host-parasite relationship. The last part, consisting of about half of the book, describes the important infectious diseases, noting their nature, means of diagnosis and, briefly, treatment. Each part is made up of a series of chapters at the end of which are listed references and a series of questions that have been specifically answered within the text. Pictures, diagrams and charts are used freely to acquaint the reader with certain famous men, equipment in use, and to condense as well as simplify information.

The reference list is necessarily limited, but the author has carefully selected key articles in other texts, monographs or reviews for those seeking further information. Perhaps it might be an improvement for the reader if a specific reference could be found, within the text, to the key article or source of information from which certain text information was obtained. Such a system would eliminate consulting all references concerning a particular subject.

The parts of the text that deal with dental caries and the bacteria of the oral cavity were of natural interest to the reviewer. They are intended mainly for general information. The author enumerates the myriads of micro-organisms that can be present in the oral cavity and stresses their importance in health and disease. In considering anaerobic cultures from the gingival crevices, the author refers to Bacterium melaninogenicum as one of the most abundant anaerobic organisms. The report by E. S. Hemmens (*J. Infect. Dis.* 70:131, 1942) lists this organism as occurring in only 28 per cent of anaerobic cultures from the gingival crevices of 46 cases of suppurative periodontitis, and was found in only 3 per cent of the gingival cultures form 27 "normal" mouths. The reviewer feels that mention should have been made of the advantages of the dark-field examination, as pointed out by Hampp (*J.A.D.A.* 32:318, 1945), over stained smears of specimens from infections suspected of being due to a combined action of spirochetes and fusiform bacilli.

As a whole the text is very commendable. Dental students or dentists would find it valuable for reviewing microbiology; obtaining information as to practical aseptic technics, the nature of communicable disease, their control and diagnosis; and technics in study of micro-organisms. —*Ned B. Williams.*

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MEDICAL AND SURGICAL SUPPLIES DESPERATELY NEEDED IN WAR-DEVASTATED AREAS

Continued aid in the form of medical and surgical supplies from America is needed to prevent widespread suffering and death among the peoples of war-devastated areas throughout the world. The undersigned earnestly request all members of our profession to help us provide such aid through the Medical and Surgical Relief Committee, Inc.

During the past seven years, with little publicity and modest financial support, this Committee has provided more than a million dollars worth of desperately needed medical, surgical and dental supplies and publications to stricken areas overseas. These materials are sent to hospitals, physicians and dispensaries giving *free* medical care to the needy.

Our colleagues in Europe and the East are still faced with an appalling lack of basic medical equipment. Some have not even seen a medical journal or textbook printed since 1939, and are woefully uninformed of many of the latest medical advances.

We are able to do a great deal to alleviate this situation through the Medical and Surgical Relief Committee which receives, sorts, reconditions and ships material—ranging from physicians' samples to used instruments—in response to authenticated appeals from overseas.

The items most consistently requested and most vitally needed are:

- Adhesive tape
- Ampules (all types)
- Anesthetics (local, general)
- Antiseptics
- Aspirin
- Aspirin combinations
- Autoclaves
- Baby
  - bottles
  - cereals
  - clothes
  - foods
  - nipples
- Cod liver oil
- Cotton—gauze (all forms)
- Dietary supplements
- Germicides
- Hospital ware
- Hot water bottles and syringes
- Hypo needles and syringes
- Liver and iron capsules
- Microscopes
- Penicillin (crystal, ointment, tablets)
- Quinine (tablets, capsules)
- Rubber sheeting and tubing
- Santonin and combinations
- Scientific apparatus
- Sedatives
- Standard medications for various conditions
- Sterilizers
- Streptomycin
- Sulfas (tablets, liquids)
- Surgeons gloves
- Surgeons needles
- Surgical instruments
- Thermometers (fever—F. or C.)
- Vitamins (all types and strengths for children and adults)

. . . and the most pressing need of all is for recent medical, surgical and dental textbooks and journals.

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Please forward any such supplies which you and your hospital can donate to this great need to:

The Medical and Surgical Relief Committee, Inc.
Room 328, 420 Lexington Avenue
New York 17, N. Y.

We urge you to lend your support to this vital work.

The Medical Advisory Council
MEDICAL AND SURGICAL RELIEF COMMITTEE, INC.
Allen O. Whipple, M.D., Chairman

Arthur W. Allen, M.D., Boston; H. C. Bazett, M.D., Philadelphia; Henry W. Cave, M.D., New York; Warren H. Cole, M.D., Chicago; Loyal Davis, M.D., Chicago; John M. T. Finney, Jr., M.D., Baltimore; W. Edward Gallie, M.D., Toronto; John H. Gibbon, Jr., M.D., Philadelphia; Howard K. Gray, M.D., Rochester, Minn.; John Kemper, M.D., Ann Arbor, Mich.; Charles C. Lund, M.D., Boston; Roy D. McClure, M.D., Detroit; Howard Naffziger, M.D., San Francisco; Alton Ochsner, M.D., New Orleans; I. S. Ravdin, M.D., Philadelphia, and Carnes Weeks, M.D., New York.

PHYSICAL LAW OF REPAIR

Spiedel of Seattle believes that there is a physical law of repair (*Am. J. Surg.* 74: 576 (Nov.) 1947) in the healing of all wounds. Physical, mechanical, chemical, and bacterial changes occur in rapid succession after tissue has been broken or destroyed. Immediate repair aborts many of these changes, and leads to better prognosis and results. Spiedel states the physical law of repair thus: "The healing of a wound is directly proportional to the timeliness of its aseptic coaptation."

Soon after wounding, tissue may be repaired merely by simple, mechanical coaptation. Primary union then occurs, and there is early restoration of function. Within six hours, however, important changes are wrought. The zero hour has passed; healing of the wound becomes more difficult and drawn-out. The earlier the wound is cleansed and the anatomic structures repaired and replaced, the better the chances for quick recovery.—*Postgraduate Medicine, February, 1948.*

Relation of Lesions of Tongue in Children to Niacin Deficiency. H. Bakwin; H. S. Reardon; J. S. Winn, and others, in *Am. J. Dis. Child.* 74:657 (December) 1947.

From 1942 to 1945 children with lesions of the tongue were observed at Bellvue Hospital by Bakwin and his associates. Four types of lesions were observed: acute glossitis; glossitis migrans, or geographic tongue; mild swelling the tongue, and fissures of the tongue. Effects of large doses of niacinamide (nicotinamide U.S.P.) (8 to 20 mg. per kilogram of body weight) were studied, and results were compared with those for an untreated group. Acute glossitides improved spontaneously or after chemotherapy. Of the patients with swollen and fissured tongues who were treated with niacin (nicotinic acid U.S.P.) a larger proportion showed improvement (14 of 17) than was observed among patients who received no therapy (4 of 16). In no patient was complete cure effected, although treatment was continued in 2 patients for twenty-six months. Glossitis migrans was unaffected by nicotinamide therapy. Diets of children with changes of the tongue were not demonstrably different from the diets of children without such changes. Results support the view that nicotinic acid has a favorable influence on the nutrition of the tongue. They fail to substantiate the view that the lesions of the tongue commonly seen in children are due to nicotinic acid deficiency.

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SUCCESS AND SOCIETY

"Man," said Aristotle, "is a social animal." The beginnings of his social organization are lost in the mists of the past. We can but guess at the life of our remote cousins the cave people, but the most primitive tribes, such as the Australian Arunta, in the food-gathering, Stone Age stage of development, show a most complex organization based, not on the family, as such, but on the tribe or *gens,* whose purpose and achievement is mutual aid. It is by mutual aid that man has risen to his present stature, defective and inadequate though that may often be. In such a Stone Age society the individual's responsibility towards that society is shown in almost every act he does, and perhaps even more in those which he does not do because they are taboo.

* * *

From this background there is derived a universal desire for success, a desire that is unappeasable and persistent. Nevertheless, each individual has his own method; at some time during the first few years of life these objectives, these standards, these methods, become more or less fixed, and when fixed there are few that can depart from them; they constitute the individual's style of life. Success, you will appreciate, is a positive aim in the psychological rather than the physical sphere. Adler has indicated how, in many, a desire for success becomes an urge for "superiority," which is based upon an inward feeling of inferiority. These objectives are individual, indeed egotistic, in nature; man, however, does not live by himself; his success must be among his fellows, in a social milieu. Only by mutual aid has man risen. He has a strong potential capacity for co-operation, which is capable of indefinite expansion and development. Without having the force of an instinct, man has a powerful urge to co-operate. He has to meet this twofold objective in a social milieu. We can apply to his answers to life's questions the following criteria: (*a*) are they co-operative or non-co-operative?; (*b*) are they courageous or cowardly?; (*c*) are they constructive or destructive?; (*d*) are they useful or useless?; (*e*) are they reasonably altruistic or are they essentially egotistic? In so far as it tends towards the first answer an action tends toward a *genuine* success; in so far as it tends towards the latter the action tends towards a *spurious* success.—C. O. Stallybrass, in *Pub. Health* 61:124 (April) 1948.

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